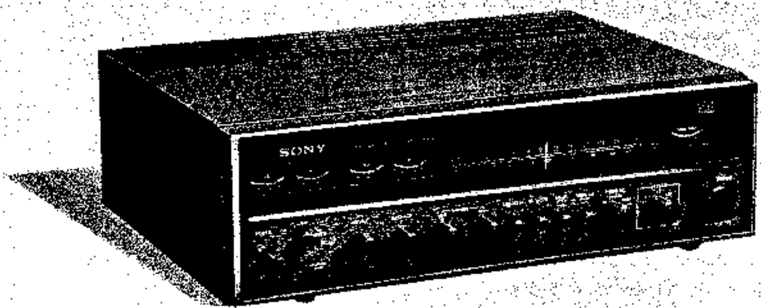
SQR-6650

USA and Canada Model



FM STEREO/FM-AM RECEIVER

SPECIFICATIONS

Fm Tuner Section

Frequency range:	87.5 MHz to 108 MHz
Sensitivity:	2.2 μV, IHF 1.7 μV, S/N = 30 dB
Capture ratio:	1.5 dB
Frequency response:	30 Hz to 15 kHz $\pm\frac{1}{2}$ dB
Stereo separation:	35 dB at 400 Hz

A-m Tuner Section

Frequency range:	530 kHz to 1,605 kHz
Sensitivity:	48 dB/m, built-in antenna 30 μV, external antenna
Signal-to-noise ratio:	50 dB

Audio Amplifier Section

Dynamic power output: (IHF constant power supply method)	Four-channel operation 56 watts (8 ohms) 96 watts (4 ohms) Two-channel operation 90 watts (8 ohms)
Continuous RMS power output (less than 0.8% THD at 1 kHz): (rated output)	Four-channels driven simultaneously; 8 + 8 + 8 + 8 watts (8 ohms) 11 + 11 + 11 + 11 watts (4 ohms) Two-channels driven simultaneously; 25 + 25 watts (8 ohms)
Harmonic distortion:	Less than 0.8% at rated output Less than 0.2% at 1 watt output
Frequency response:	PHONO: RIAA equalization curve ±1 dB AUX, TAPE, REC/PB (input), 4-CH INPUT: 20 Hz to 50 kHz $^{+0}_{-3}$ dB

General

Power requirements:	120 volts, 60 Hz ac
Power consumption:	140 watts
Dimensions:	434 (w) x 144 (h) x 345 (d) mm $17\frac{1}{8}$ (w) x $5\frac{11}{16}$ (h) x $13\frac{9}{16}$ (d) inches
Net weight:	9.5 kg (20 lb 15 oz)

SONY®

SERVICE MANUAL

TABLE OF CONTENTS

SECTION 1
TECHNICAL DESCRIPTION

1-1. TECHNICAL SPECIFICATIONS

Technical specifications for the SQR-6650 are listed in Table 1-1.

TABLE 1-1. SQR-6650 TECHNICAL SPECIFICATIONS

Fm Tuner Section

Frequency range:	87.5 MHz to 108 MHz
Antenna terminals:	300 ohms balanced
Intermediate frequency:	10.7 MHz
Sensitivity:	2.2 μV, IHF 1.7 μV, S/N = 30 dB
Image rejection:	55 dB
I-f rejection:	90 dB
Spurious rejection:	78 dB
A-m suppression:	55 dB
Capture ratio:	1.5 dB
Selectivity:	70 dB, IHF
Signal-to-noise ratio:	68 dB
Frequency response:	30 Hz to 15 kHz $\pm\frac{1}{2}$ dB
Harmonic distortion:	Mono 0.3% at 400 Hz, 100% modulation Stereo 0.8% at 400 Hz, 100% modulation
Stereo separation:	35 dB at 400 Hz

A-m Tuner Section

Frequency range:	530 kHz to 1,605 kHz
Antenna:	Built-in bar antenna and external antenna terminal
Intermediate frequency:	455 kHz
Sensitivity:	48 dB/m, built-in antenna 30 μV, external antenna
Image rejection:	56 dB at 1,000 kHz
I-f rejection:	40 dB at 1,000 kHz
Signal-to-noise ratio:	50 dB
Harmonic distortion:	0.8%

Audio Amplifier Section

Dynamic power* output: (IHF constant power supply method)	Four-channel operation; 56 watts (8 ohms) 96 watts (4 ohms) Two-channel operation; 90 watts (8 ohms)
Continuous RMS power output: (less than 0.8% THD at 1 kHz) (rated output)	Four-channels driven simultaneously; 8+8+8+8 watts (8 ohms) 11+11+11+11 watts (4 ohms) Two-channels driven simultaneously; 25+25 watts (8 ohms)
Power bandwidth: (IHF)	10 Hz to 40 kHz
Harmonic distortion:	Less than 0.8% at rated output Less than 0.2% at 1 watt output
IM distortion: (60 Hz : 7 kHz = 4 : 1)	Less than 1.0% at rated output Less than 0.5% at 1 watt output
Frequency response:	PHONO: RIAA equalization curve ±1 dB AUX, TAPE REC/PB (input), 4-CH INPUT: 20 Hz to 50 kHz $\pm^{0}_{3}$ dB
Input sensitivity and impedance:	PHONO: 2.5 mV, 47k ohms AUX, TAPE REC/PB, 4-CH INPUT: 250 mV, 100k ohms Measured with rated output
Signal outputs:	REC OUT: 250 mV, 10k ohms REC/PB: 30 mV, 82k ohms HEADPHONE: Accepts low or high impedance headphone 4-CH SPEAKER OUTPUT impedance: 4 to 16 ohms 2-CH SPEAKER OUTPUT impedance: 8 to 16 ohms
Signal-to-noise ratio:	PHONO: 60 dB, 2.5 mV (weighting network B) AUX: 70 dB, 250 mV (weighting network A) TAPE: REC/PB: 4-CH INPUT: 80 dB, 250 mV (weighting network A)

Damping factor:	35 (8 ohms)
Tone controls:	BASS: 100 Hz ± 10 dB TREBLE: 10 kHz ± 10 dB
High filter:	6 dB/octave above 5 kHz
Loudness switch:	50 Hz + 8 dB, 10 kHz + 4 dB (at 30 dB attenuation)

General

Circuit system:	Four-channel receiver containing SQ and other matrix decoders Superheterodyne fm/a-m tuner, switching MPX Quasi-complimentary symmetry circuit (SEPP OTL)
Power requirements:	120 volts, 60 Hz ac
Power consumption:	140 watts
Ac outlet:	1 unswitched, maximum 300 watts
Dimensions:	434 (w) x 144 (h) x 345 (d) mm 17⅛ (w) x 5¹¹⁄₁₆ (h) x 13⁹⁄₁₆ (d) inches
Net weight:	9.5 kg (20 lb 15 oz)
Shipping weight:	13.5 kg (29 lb 13 oz)

1-2. NEWLY ADOPTED CIRCUIT DESCRIPTION

1. Stereo-Mono Automatic Switching Circuit (See Fig. 1-1)

This circuit prevents noisy stereo reception by automatically switching the MPX decoder's operation into monaural mode.

Noisy signals above 19 kHz are extracted from the emitter circuit of Q301 and applied to the base of Q304 through high-pass filter (L303, C334). The coupling capacitor C335 filters out audio components so that the input signal is primarily high-frequency noise.

Noisy signal is amplified by Q304 to drive voltage doubler D307 and D308. D309 provides positive fixed bias for Q304 through D307 and D308. When weak stereo signal or interstation noise is received, the output of D307 is fed back to the base of Q304, and drives Q304 into conduction. This in turn shorts the frequency doubler (D301, D302) output to ground through R320, preventing amplification of the incoming signal, and therefore operation of the 38 kHz amplifier and stereo indicator circuit, Q302 and Q303. When a stereo signal is received, the signal-to-noise ratio increases, reducing the noisy signal at the base of Q304. Therefore Q304 turns off and enables the stereo demodulator circuit to operate.

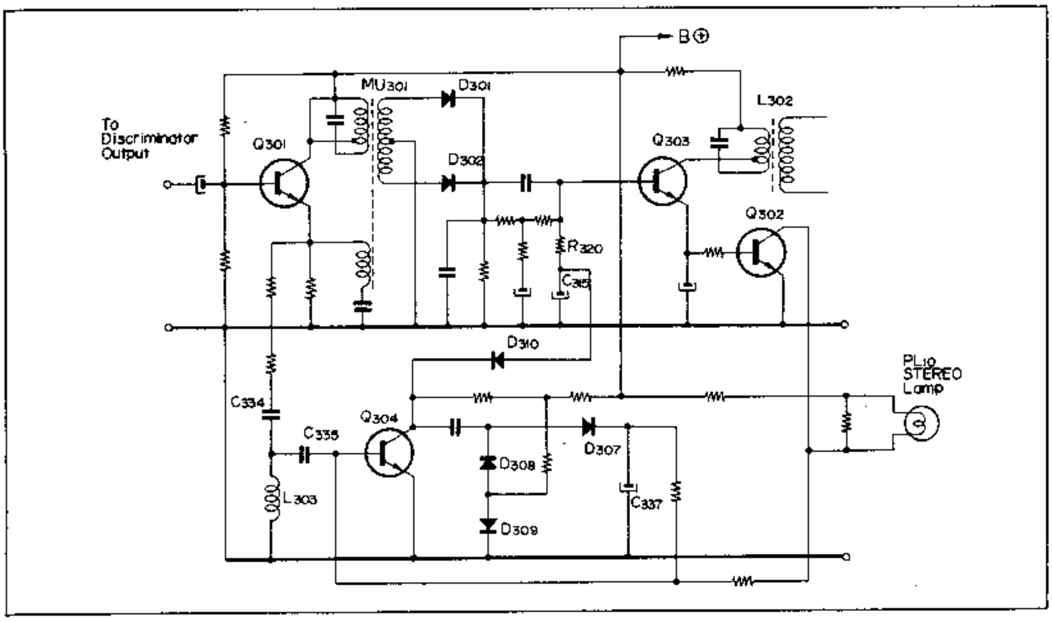


Fig. 1-1. Stereo-mono automatic switching circuit

2. SQ Decoder Section

SQR-6650 uses simplified SQ decoder which does not contain logic circuit as shown in Fig. 1-2. Notice that front channels are mixed by 20% and back channels are mixed by 40% through R776 and R725 respectively at the decoder outputs. We call this circuit as 20-40 Decoder. Lt and Rt signals are fed to the phase shifters ϕ-0° (Q601, Q602; Q651, Q652) and ϕ-90° (Q601, Q701; Q651, Q751). Note that Q601 and Q651 are used both for ϕ-0° and ϕ-90° circuit.

ϕ-0° and ϕ-90° phase shifters are so designed that they pass all audio frequencies (30 Hz to 20 kHz) unattenuated (referred to 1 kHz) and maintaining their relative phase angles at 90° to each other as shown in Fig. 1-4.

L(ϕ-90°), R(ϕ-0°) signals are mixed by resistive matrix (R660 and R710) to produce the Lb' output. L(ϕ-0°), R(ϕ-90°) signals are mixed by R610 and R761 to produce the Rb' output.

Since L(ϕ-0°) and R(ϕ-0°) are themselves equivalent to the Lf' and Rf' respectively, they are simply fed to the buffer amplifiers.

Q702 and Q752 act as phase inverter and effective for SQ and MATRIX functions respectively. Q702 corrects the phase inversion performed in the Lb' signal during SQ decoding, while Q752 corrects the phase inversion in Rb' during conventional matrix decoding.

Thus two input signals (Lt, Rt) are converted into four signals (Lf', Rf', Lb', Rb') having close relationship to the original four signals as shown in Fig. 1-3.

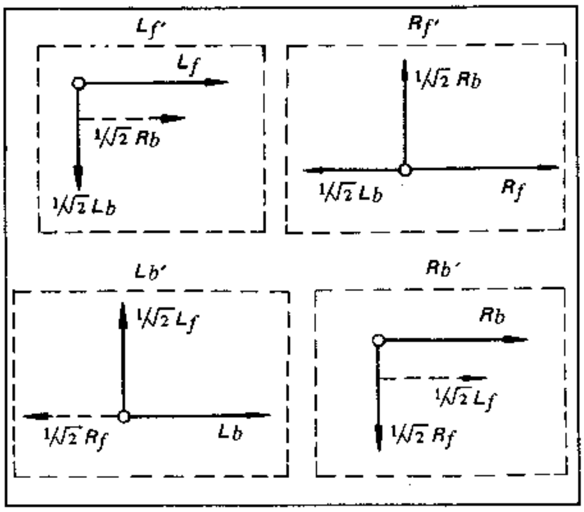


Fig. 1-3. Phasor components in SQ decoding

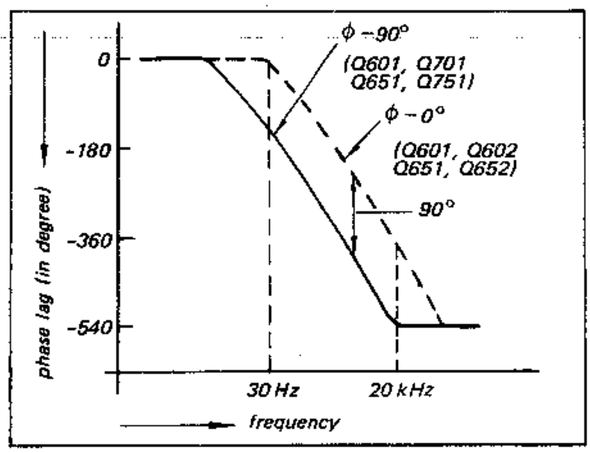


Fig. 1-4. Phase shifter response

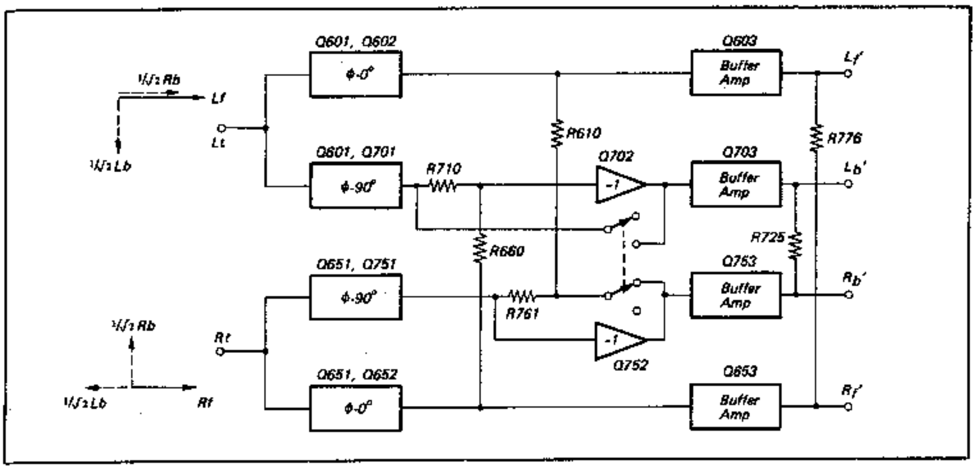


Fig. 1-2. SQ decoder chain

Q603, Q703, Q653 and Q753 are buffer amplifiers and compensate the signal attenuation in the resistive matrix.

The following blend matrix (R776 and R725) increases separation between Cf′ (center front) and Cb′ (center back) signals comparing to basic SQ decoder separation as shown in Fig. 1-5 and 1-6.

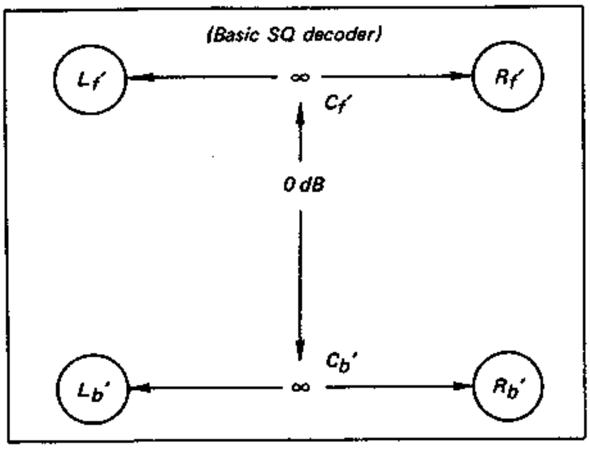


Fig. 1-5. Separation diagram (1)

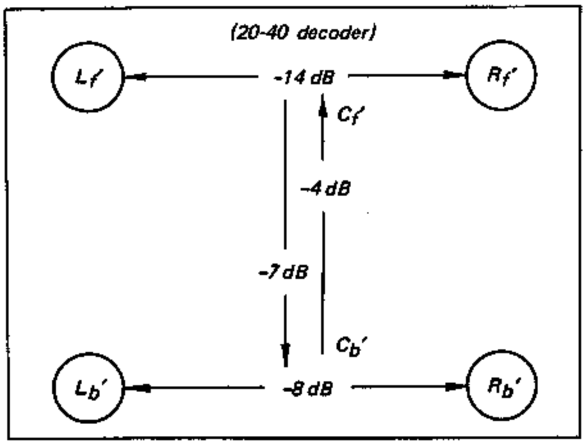


Fig. 1-6. Separation diagram (2)

3. Double-Stacked Differential Output Circuit

This circuit is only effective for conventional two-channel reproduction by SQR-6650. As illustrated in Fig. 1-7, double-stacked differential output circuit uses front and back power amplifiers by adding a 2-CH/4-CH selector and attenuator circuit. Note that the output forms a balanced push-pull circuit thus the output power becomes approximately double. The balanced output is obtained by using the original power amplifier input-output phase inversion and inserting a load in series between each output hot side.

S8 changes the signal route and R937 attenuates the signal level by the same amount of front power amplifier voltage gain.

Thus, same but opposite phase signal is supplied to front and back power amplifier inputs simultaneously. As a result, power applied to the load is doubled. R933 and R934 network maintains overall back power amplifier gain constant in double stack operation.

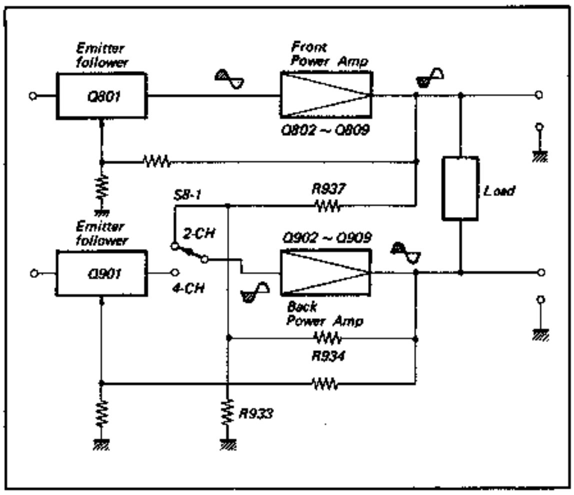
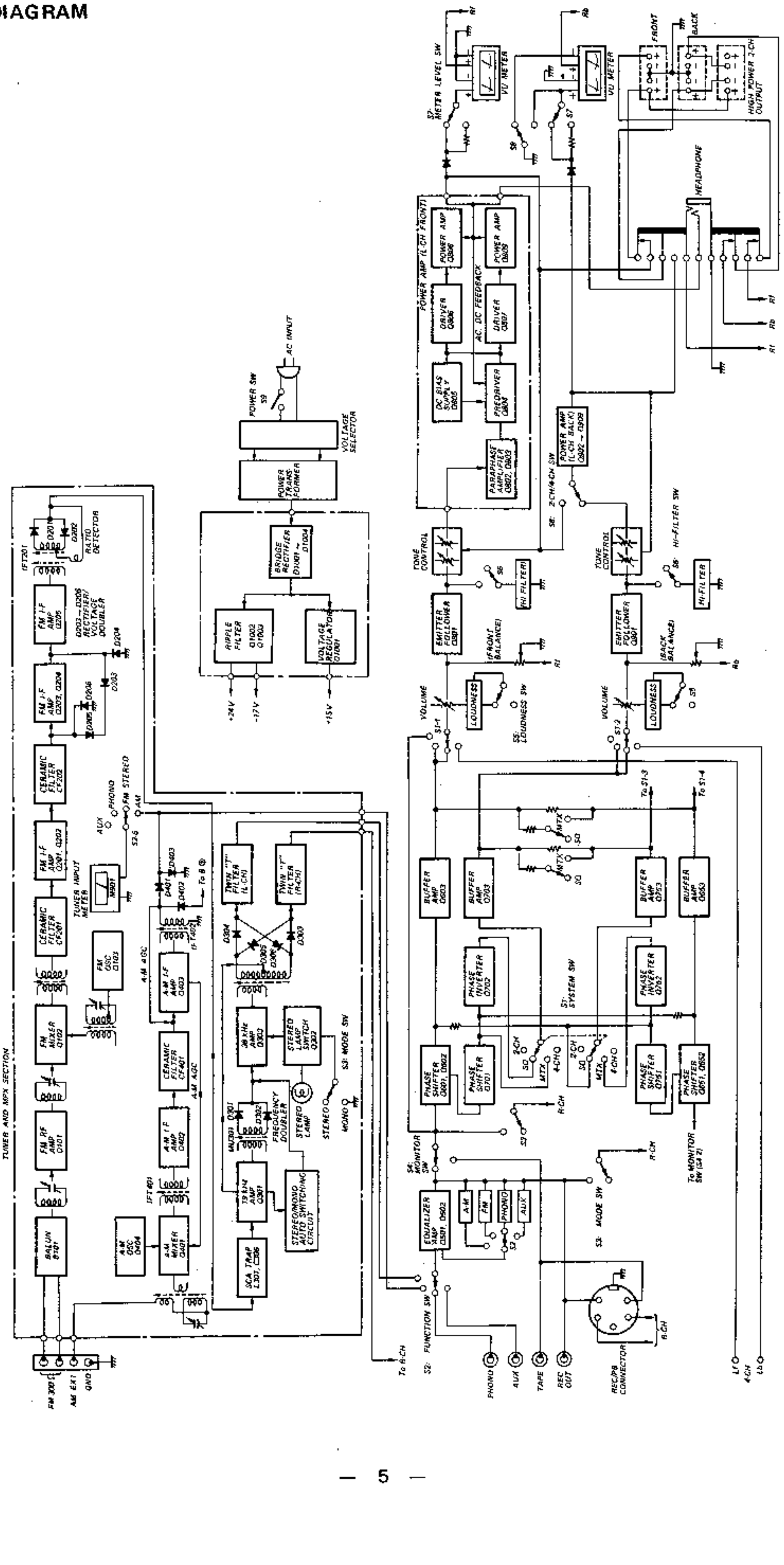
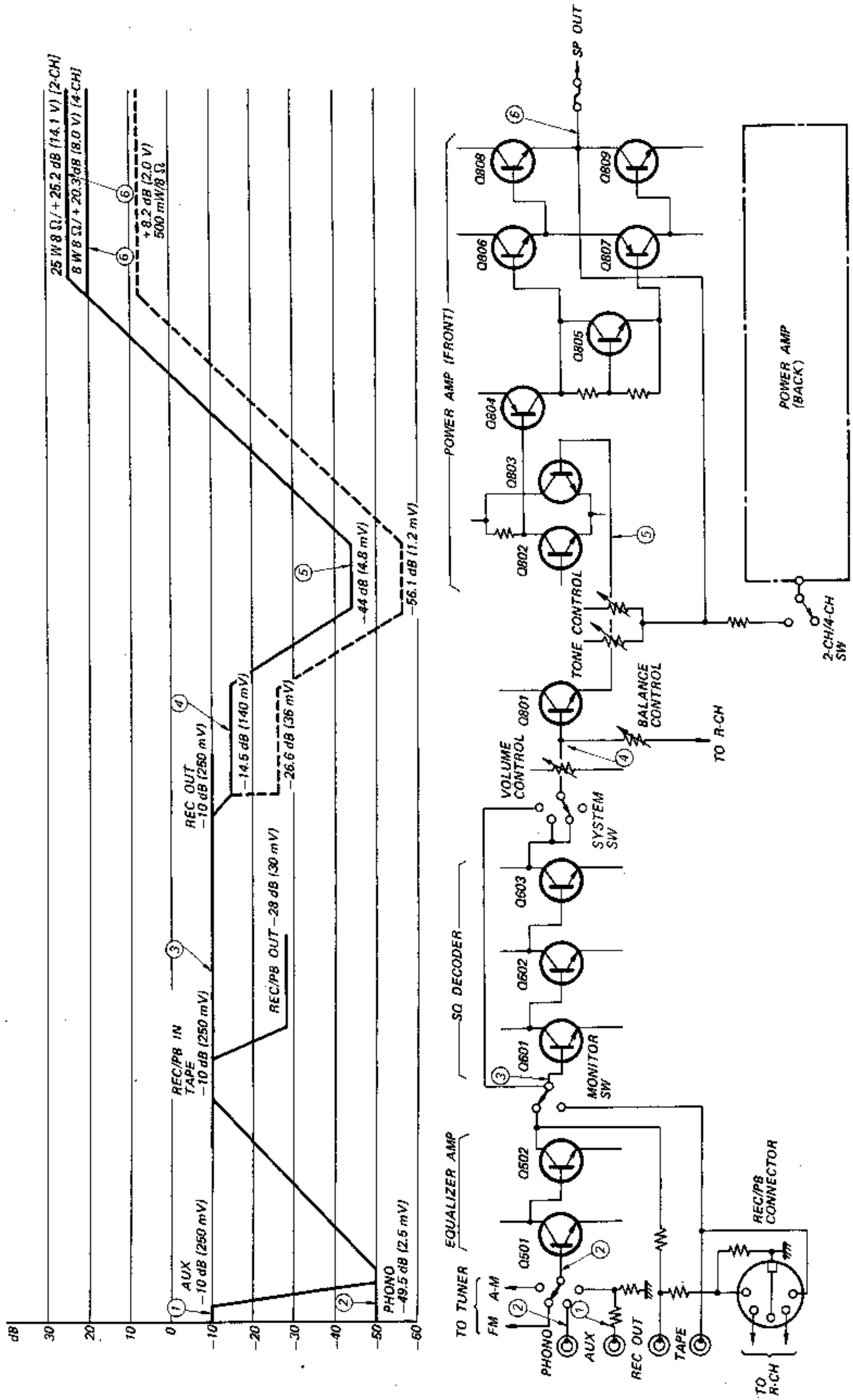


Fig. 1-7. Double stack circuit

1-3. BLOCK DIAGRAM



1-4. LEVEL DIAGRAM



Note: Signal voltages are measured with an ac VTVM and expressed in dB referred to 0.775 V, 1 kHz.

SECTION 2
DISASSEMBLY AND REPLACEMENT

2-1. TOP COVER REMOVAL

1. Remove the two screws at each side of top cover shown in Fig. 2-1.
2. Carefully push the top cover backward and pull it up as shown in Fig. 2-1.

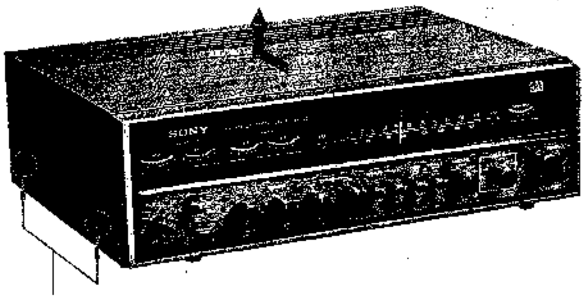


Fig. 2-1. Top cover removal

2-2. BOTTOM PLATE REMOVAL

Remove the eight screws shown in Fig. 2-2.

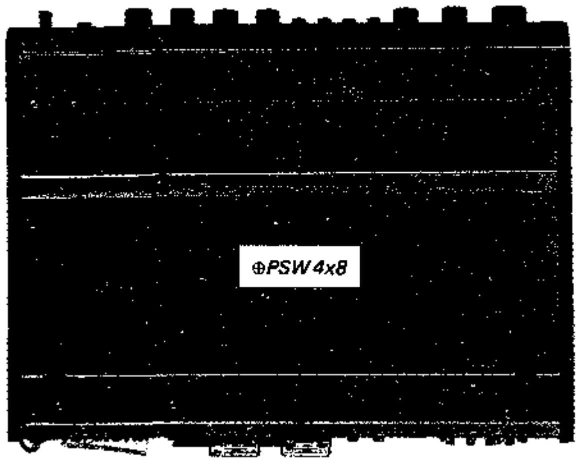


Fig. 2-2. Bottom plate removal

2-3. CONTROL PANEL REMOVAL

Remove the two hexagon-head collars shown in Fig. 2-3.

2-4. FRONT SASH REMOVAL

Remove the four screws shown in Fig. 2-4.

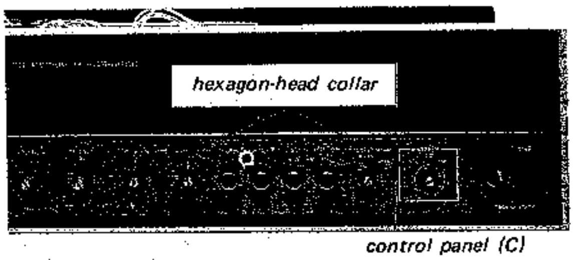


Fig. 2-3. Control panel removal

Fig. 2-4. Front sash removal

2-5. DIAL GLASS REMOVAL

1. Remove the top cover and front sash as described in Procedures 2-1 and 2-4.
2. Remove the five screws shown in Fig. 2-5.

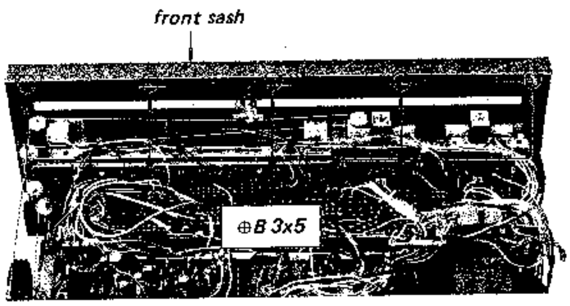


Fig. 2-5. Dial glass removal

2-6. METER LAMP REPLACEMENT

1. Remove the top cover as described in Procedure 2-1.
2. Remove the meter lamp shade after taking out the two screws shown in Fig. 2-6.
3. Remove the defective lamp and install a new one.

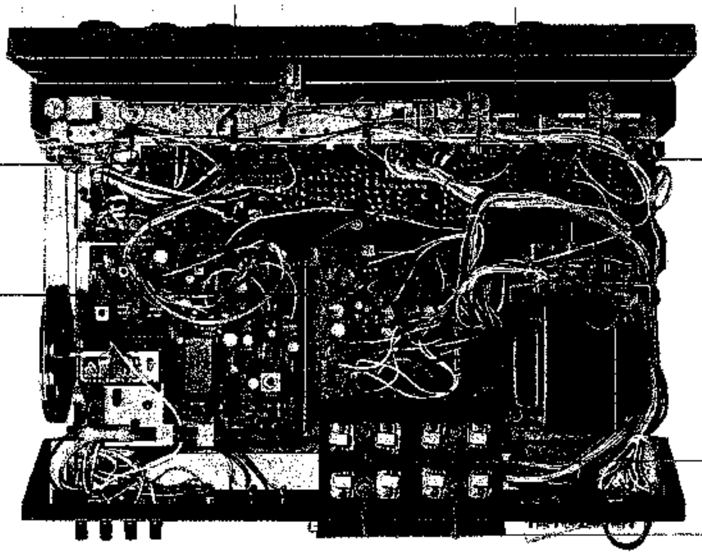


Fig. 2-6. Lamp, meter and circuit board removal

2-7. VU METER REPLACEMENT

1. Remove the top cover as described in Procedure 2-1.
2. Remove the meter lamp shade after taking out the two screws shown in Fig. 2-6.
3. Carefully remove the defective VU meter from the front subchassis with a screwdriver and install a new one.

2-8. DIAL LAMP REPLACEMENT

1. Remove the top cover as described in Procedure 2-1.
2. Remove the dial lamp shade after taking out the two screws shown in Fig. 2-6.
3. Remove a defective dial lamp and install a new one.

2-9. POWER AMP BOARD REMOVAL

1. Remove the top cover as described in Procedure 2-1.
2. Remove the four screws shown in Fig. 2-6.
3. Remove the power amp board together with the heat sink.

2-10. DIAL-CORD RESTRINGING

Preparation:

1. Remove the top cover as described in Procedure 2-1.
2. Cut a 1,650 mm (65-inch) length of 0.3 mm (1/64-inch) diameter dial cord.
3. Rotate the tuning-capacitor drum fully clockwise (minimum capacitance position).
4. Hook the spring to one hole of the drum as shown in Fig. 2-7.

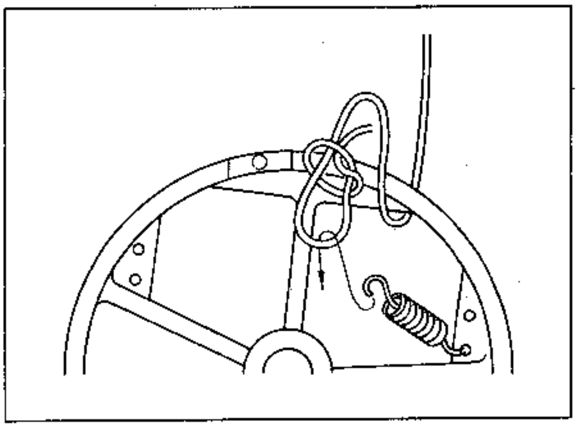


Fig. 2-7. Tying square knot in the tension spring

Procedure:

String the dial cord in order as shown in Fig. 2-8.

Note: At the finish point, pass the doubled end of the cord through the eyelet (see Fig. 2-9) and tighten the cord and squeeze the eyelet so that the spring is under tension.
Make two knots in the cord end to keep it from slipping out of the eyelet as shown in Fig. 2-10.

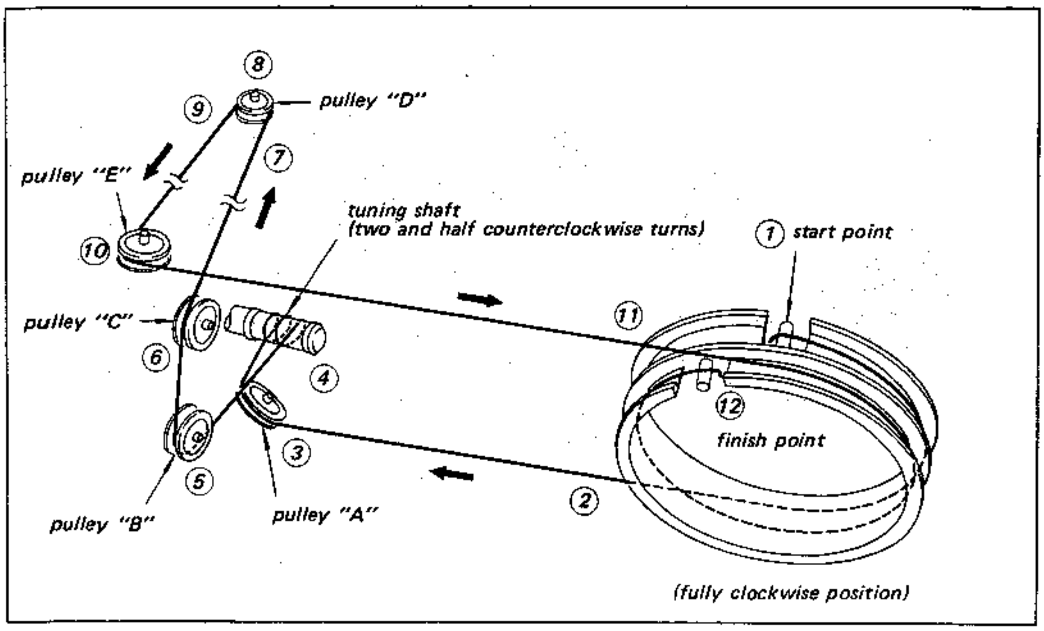


Fig. 2-8. Dial-cord stringing

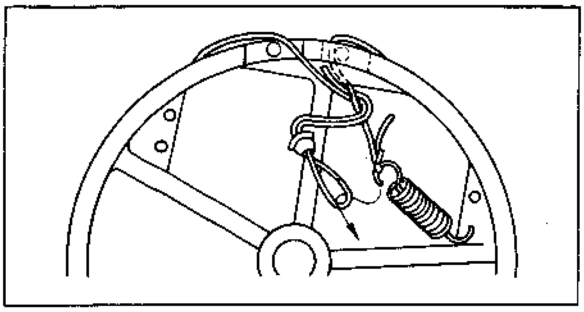


Fig. 2-9. End of dial-cord stringing

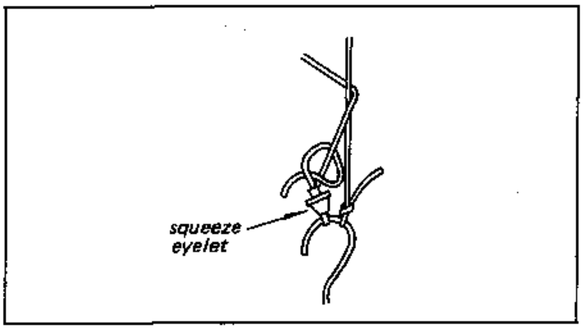


Fig. 2-10. Detail of dial-cord finish

2-11. CONTROL AND SWITCH REPLACEMENT ON CONTROL BOARD

1. Remove the top cover as described in Procedure 2-1.
2. Fasten the dial-cord to the drum with cellophane tape as shown in Fig. 2-11.
3. Remove the front subchassis after taking out the ten screws and the nut shown in Fig. 2-11.
4. Remove the control and switch bracket after taking out the eight screws and the six nuts shown in Fig. 2-12.
5. Remove the control board after taking out the three screws shown in Fig. 2-6.
6. Remove the defective control or switch and install a new one.
7. Remove the cellophane tape stuck in step 2.

Note: Make sure that the dial is mechanically calibrated after reassembling the front subchassis.

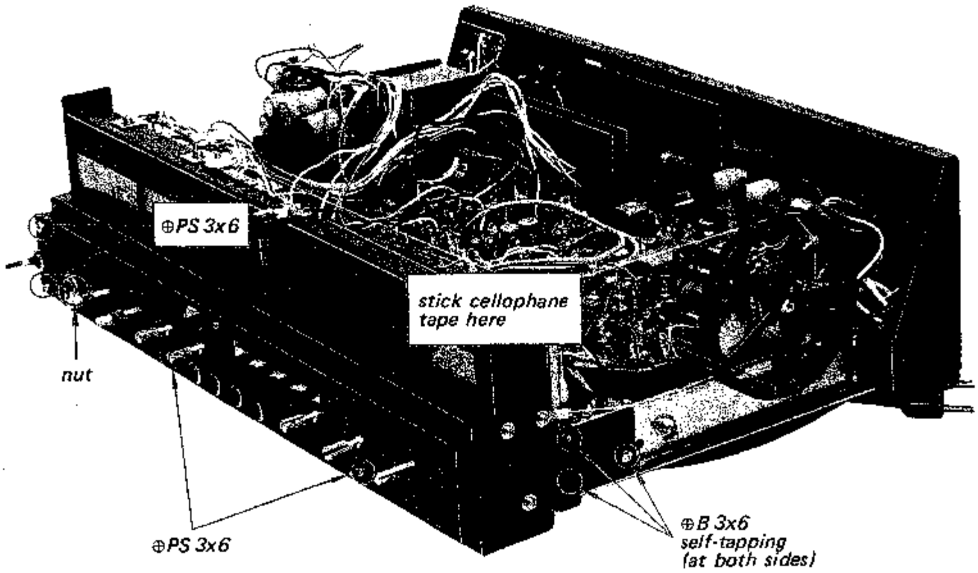


Fig. 2-11. Front subchassis removal

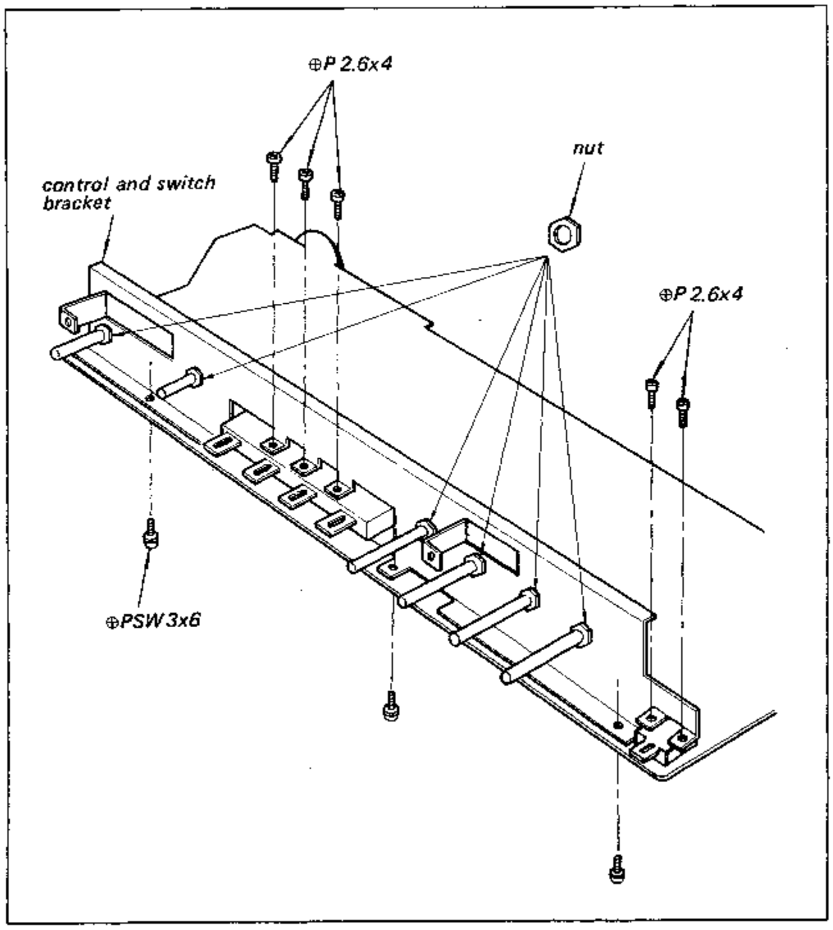


Fig. 2-12. Control and switch bracket removal

2-12. CHASSIS LAYOUT

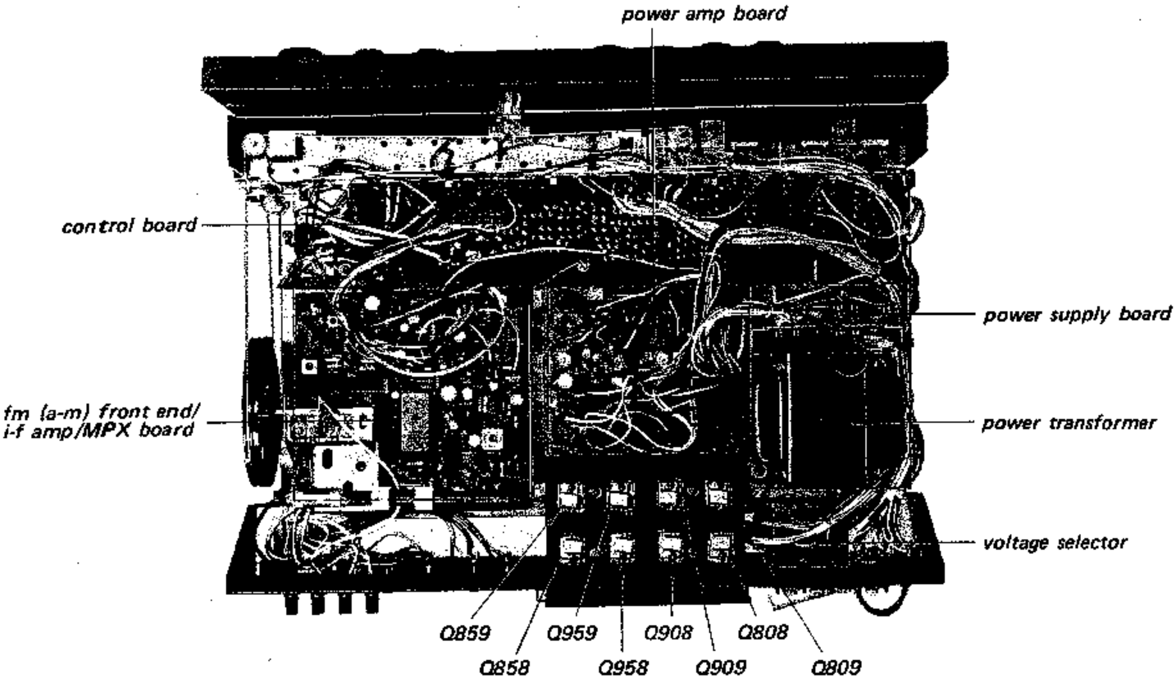


Fig. 2-13. Chassis layout top view

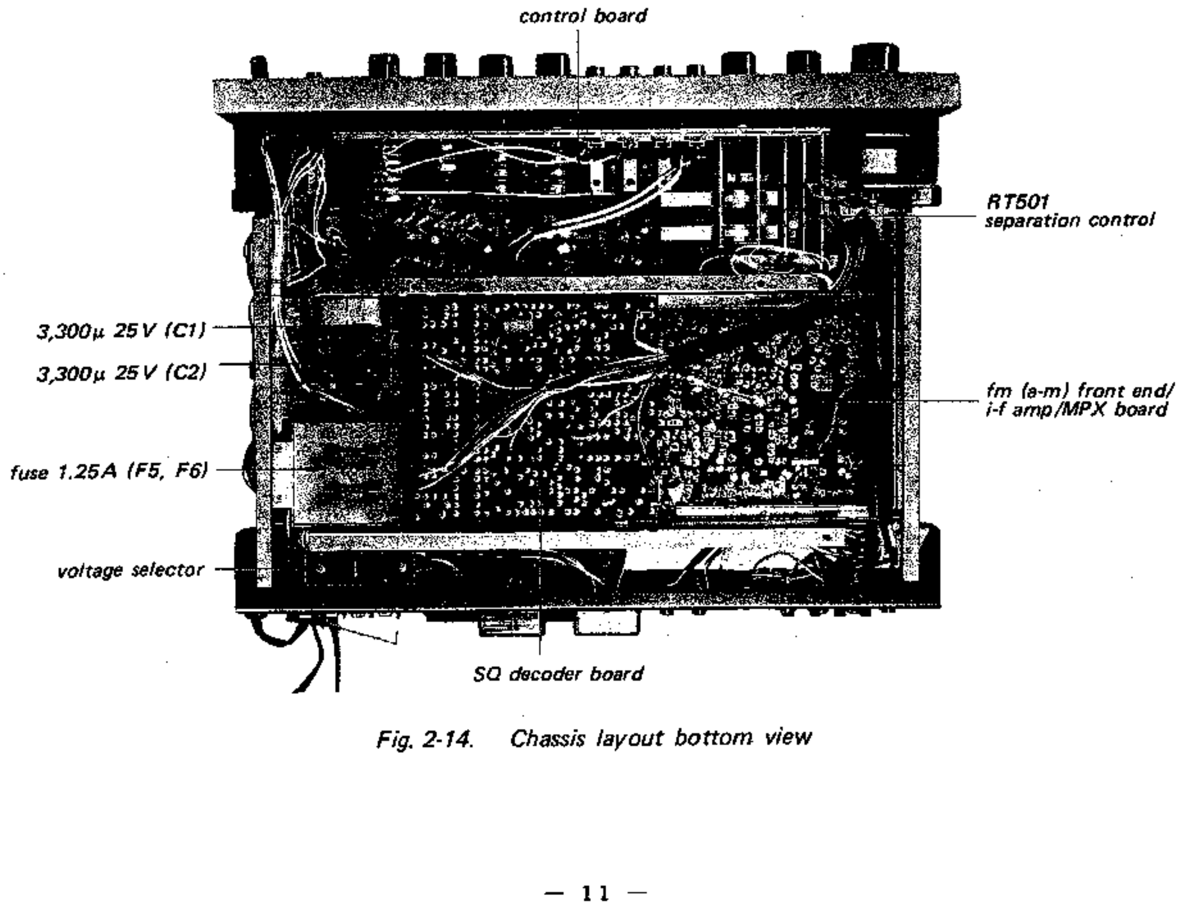


Fig. 2-14. Chassis layout bottom view

SECTION 3
ALIGNMENT AND ADJUSTMENT

3-1. FM I-F AND DISCRIMINATOR ALIGNMENT

CAUTION

The ceramic filters in the fm i-f circuit are selected according to their specified center frequencies and color coded as shown in Fig. 3-1 and listed in Table 3-1. Check the color code of the filters to identify the same center frequency when replacing any of these filters.

TABLE 3-1.

FM I-F CERAMIC FILTERS

Part No.	*Color*	*Specified Center Freq.*
1-527-507-11	red	10.70 MHz
1-527-507-21	black	10.66 MHz
1-527-507-31	white	10.74 MHz
1-527-507-41	green	10.62 MHz
1-527-507-51	yellow	10.78 MHz

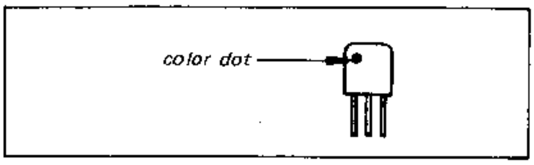


Fig. 3-1. Color dot on ceramic filter

Note: Two methods of i-f discriminator alignment are available, sweep generator alignment and signal generator alignment. You can use either of them. In either case, the local oscillator should be killed. To stop the local oscillator operation, remove the shield cover over the local oscillator capacitor, and shunt the oscillator capacitor with a 0.02μF capacitor as shown in Fig. 3-2.

Sweep Generator Method

Test Equipment Required

1. 10.7 MHz sweep generator
2. Oscilloscope
3. Ceramic capacitor, 0.02μF
4. Alignment tools

Preparation

1. Connect the input cable of the oscilloscope with alligator clips to R221 and ground on the fm (a-m) front-end/i-f amp/MPX board, and solder a 0.02μF capacitor across these clips as shown in Fig. 3-3.
2. Connect the output cable of the sweep generator across CV102 on fm (a-m) front-end/i-f amp/MPX board through a 0.02μF coupling capacitor as shown in Fig. 3-4.

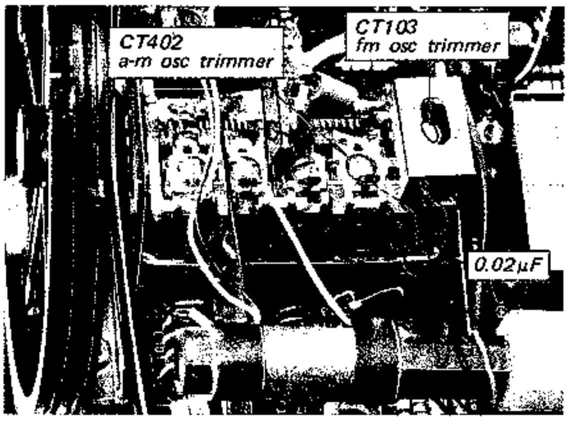


Fig. 3-2. Interruption of fm or a-m local oscillator

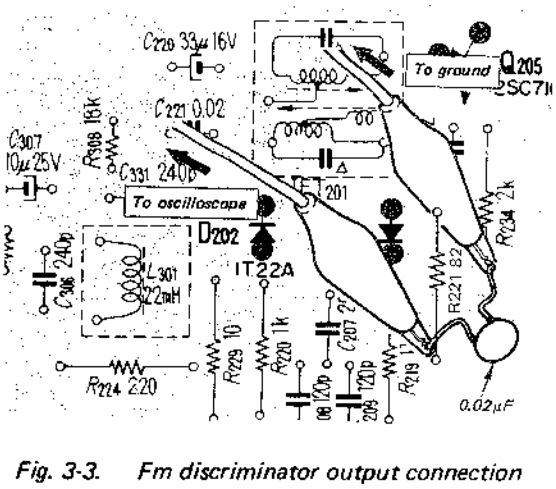


Fig. 3-3. Fm discriminator output connection

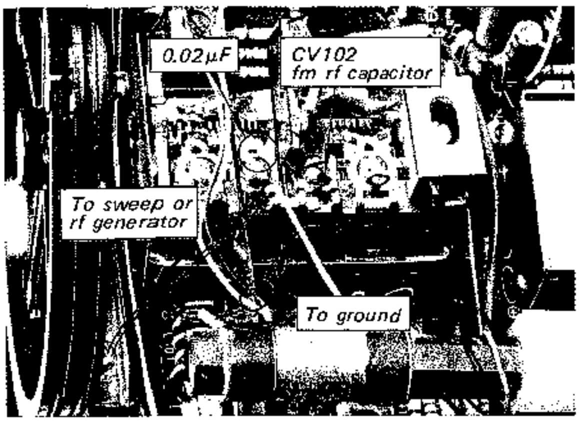


Fig. 3-4. 10.7 MHz signal injection

Procedure

1. With the equipment connected as shown in Fig. 3-5, set the sweep generator controls as follows:
   Center frequency .... Specified frequency of ceramic filter. See Table 3-1.
   Sweep width .... 1 MHz
2. Set the receiver controls as follows:
   FUNCTION switch .... FM STEREO
   VOLUME control ..... Minimum
3. Adjust the oscilloscope controls to provide a visible indication:

   Note: Two or three traces will be observed on the oscilloscope as the center frequency of the sweep generator varies. The trace you are looking for has the largest amplitude. Once you get it, decrease the sweep generator output to obtain rather noisy output.

4. Turn the top core (secondary side) of discriminator transformer IFT201 (see Fig. 3-10) with an alignment tool to obtain the "S" curve response, and equalize the positive and negative peaks of the "S" curve response as shown in Fig. 3-6.
5. Adjust i-f transformer IFT101 (see Fig. 3-10) and primary side of discriminator transformer (IFT201 bottom core) to obtain a maximum-amplitude "S" curve response.

Fig. 3-6. "S" curve response

Signal Generator Method

Test Equipment Required

1. Signal generator capable of generating a 10.7 MHz a-m/fm signal.
2. Oscilloscope
   Vertical sensitivity .... 100mV/cm minimum
3. Alignment tools

Preparation

Same as described for the sweep generator method.

Procedure

1. With the equipment connected as shown in Fig. 3-7, set the signal generator controls as follows: follows:
   Frequency .... Specified frequency of ceramic filter. See Table 3-1.
   Modulation .... Fm, 400 Hz, 100% (75 kHz)
   Output level .... 10,000μV (80 dB)
2. Set the receiver controls as follows:
   FUNCTION switch .... FM STEREO
   VOLUME control ..... Minimum

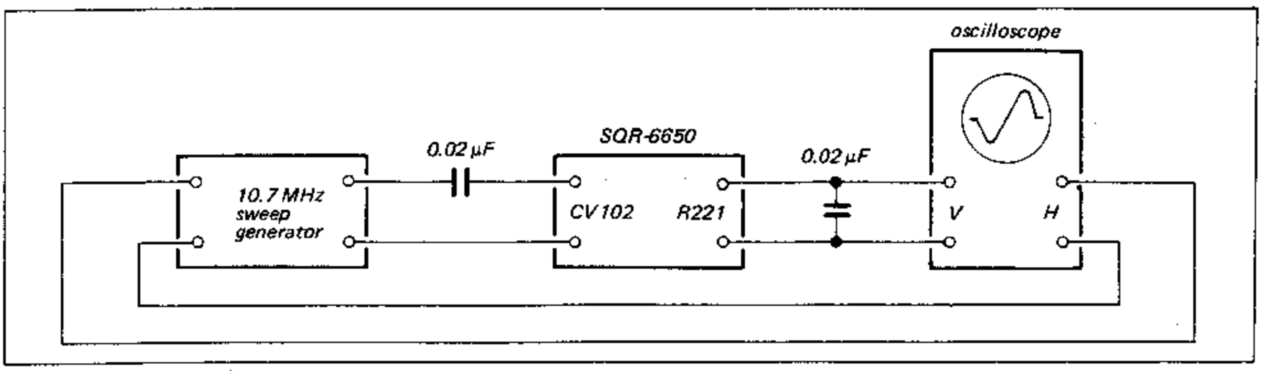


Fig. 3-5. Discriminator alignment test setup by sweep generator

3. Adjust the signal generator frequency slightly to obtain a maximum output, and then change the signal generator modulation to a-m, 400 Hz 30%.
4. If the discriminator transformer IFT201 (see Fig. 3-10) is not aligned correctly, 400-Hz ripple will be observed as shown in Fig. 3-8.
5. Turn the top core of discriminator transformer IFT201 with an alignment tool to obtain a minimum indication on the oscilloscope as shown in Fig. 3-8.

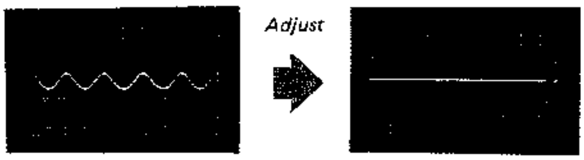


Fig. 3-8. Fm discriminator alignment output response

Note: Turn the core carefully and slowly because the output appearing on the oscilloscope jumps up and down when turning the core. This might cause difficulty in determining the point of minimum output.
Also, at both extreme positions of the top core, decreased output will be observed. The real null point should be obtained in the middle of the core thread length, and maximum output occurs at each side of the true null point.

6. Change the signal generator modulation to fm, 400 Hz 100% (75 kHz).
7. Turn the core of fm IFT101 (see Fig. 3-10), and the primary side of discriminator transformer (IFT201 bottom core) to obtain the maximum output.

3-2. FM FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Note: Before starting this alignment, the discriminator-transformer alignment should be performed.

Test Equipment Required

1. Fm signal generator
2. Ac VTVM
3. Alignment tools

Preparation

1. Connect the equipment as shown in Fig. 3-9.
2. Set the receiver controls as follows:
   FUNCTION switch .... FM STEREO
   VOLUME control ..... Minimum

Generator Method

Follow the procedures given in Table 3-2.

Off-the-Air Method

Accurate dial calibration and a frequency-coverage test can also be performed by using off-the-air local fm signals.

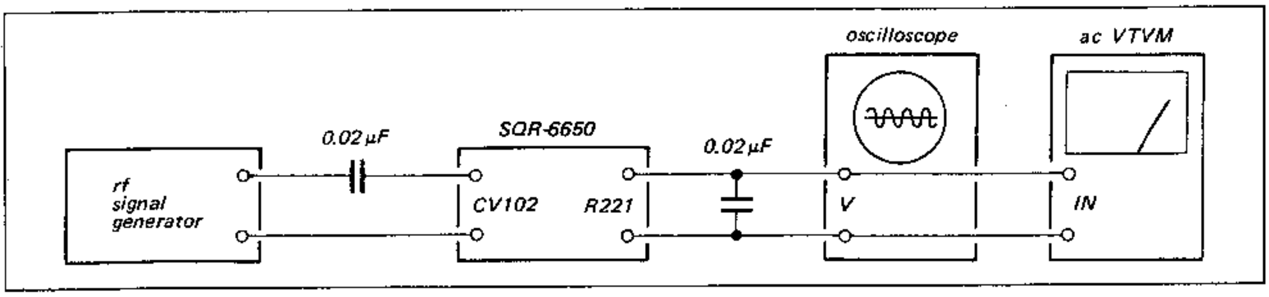


Fig. 3-7. Fm discriminator alignment test setup by rf signal generator

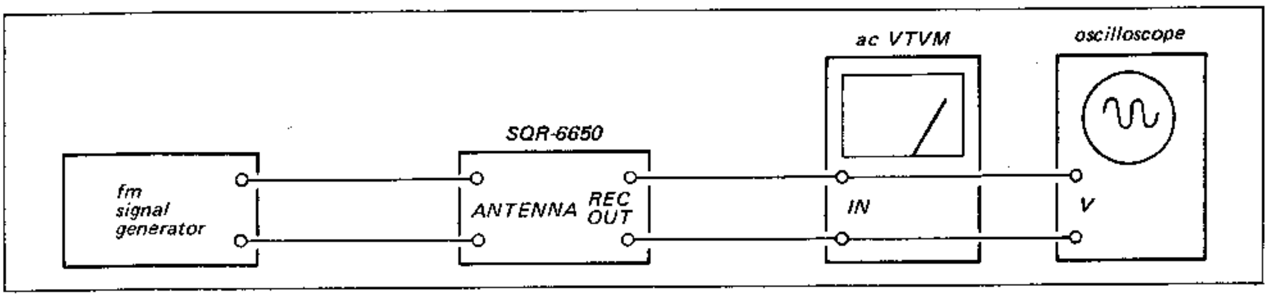


Fig. 3-9. Fm frequency coverage and tracking alignment test setup

TABLE 3-2. FM FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Step	SG Coupling	SG Frequency and Output Level	Tuner Dial Indication	Adjust	Indication
FREQUENCY COVERAGE ALIGNMENT					
1.	Direct coupling	87.5 MHz 400 Hz 100% mod. 10μV (20 dB)	lowest position	OSC coil L103 See Fig. 3-10	Maximum VTVM reading
2.	Same as above	108.4 MHz 400 Hz 100% mod. 10μV (20 dB)	highest position	OSC trimmer CT103 See Fig. 3-10	Same as above
TRACKING ALIGNMENT					
1.	Direct coupling	87.5 MHz 400 Hz 100% mod. 10μV (20 dB)	lowest position	Antenna coil L101 RF coil L102 See Fig. 3-10	Maximum VTVM reading
2.	Same as above	108.4 MHz 400 Hz 100% mod. 10μV (20 dB)	highest position	Antenna trimmer CT101 RF trimmer CT102 See Fig. 3-10	Same as above

Adjustment Parts Location

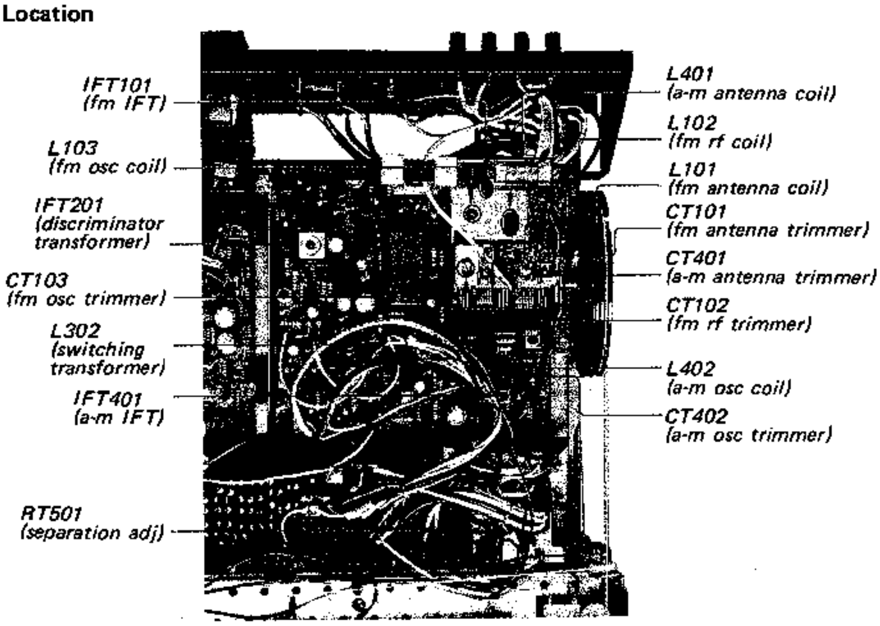


Fig. 3-10. Adjustment parts location

3-3. FM STEREO SEPARATION ADJUSTMENT

Test Equipment Required

1. MPX generator
2. Fm signal generator
3. Audio oscillator
4. Ac VTVM
5. Oscilloscope
6. Alignment tools

Preparation

Before starting the stereo-separation adjustment, check and adjust the phase between the 19-kHz pilot signal and the sub-channel signal in the MPX stereo generator as follows:

1. With the equipment connected as shown in Fig. 3-11, set the MPX and audio signal-generator controls as follows:
   MAIN CHANNEL .... OFF
   SUB CHANNEL .... ON
   PILOT (19 kHz) .... OFF
   AUDIO OSCILLATOR
   OUTPUT .... 400 Hz, 250 mV
2. Adjust the oscilloscope controls to obtain a visible indication. Be sure the scope horizontal display switch is set for external input.
3. Turn the pilot-signal (19 kHz) phase control to obtain an in-phase and stable lissajous pattern as shown in Fig. 3-12.

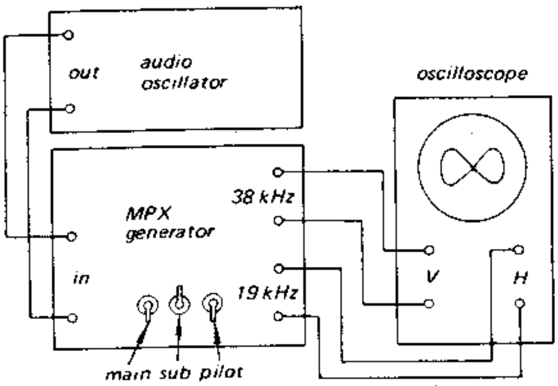


Fig. 3-11. MPX generator preadjustment

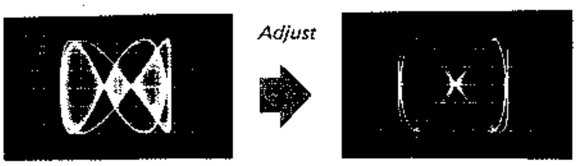


Fig. 3-12. Lissajous pattern

Procedure

1. Connect the equipment as shown in Fig. 3-13. Set the fm signal generator control as follows:
   Carrier frequency .... 98 MHz
   Output level .... 1,000μV (60 dB)
   Modulation:
   Main channel (400 Hz) .... 33.75 kHz (45%)
   Sub channel (38 kHz) ...... 33.75 kHz (45%)
   Pilot (19 kHz) .... 7.5 kHz (10%)

   The above mentioned modulation levels can be set as follows:

   (a) With the equipment connected as shown in Fig. 3-13 set the MPX stereo generator controls as follows.
   MAIN CHANNEL .... OFF
   SUB CHANNEL .... OFF
   19 kHz (PILOT) .... ON

   (b) Adjust the 19-kHz signal level to obtain a 7.5-kHz deviation on the FM SG modulation indicator.

   (c) Reset the MPX stereo-generator controls as follows:
   MAIN CHANNEL .... ON
   SUB CHANNEL .... OFF
   PILOT (19 kHz) .... OFF
   INPUT SELECTOR .... L-CH

   (d) Adjust the audio-oscillator output (400 Hz) to obtain a 33.75-kHz deviation on the FM SG modulation indicator.

   (e) Set all controls to ON.
2. Precisely tune the set to the SG carrier frequency then turn the top core of switching transformer L302 (see Fig. 3-10) to obtain maximum output at the left channel.
3. Record the output level of the left channel when the MPX generator input selector is set to the left channel.
4. Switch the input selector of stereo generator to the right channel and read the residual signal level in the left channel.
5. The output-level to residual-level ratio represents the separation. Turn separation control RT501 (see Fig. 3-10) for minimum residual level. Check the right channel for separation.
6. Readjust separation control RT501 for minimum difference between left- and right-channel separation.

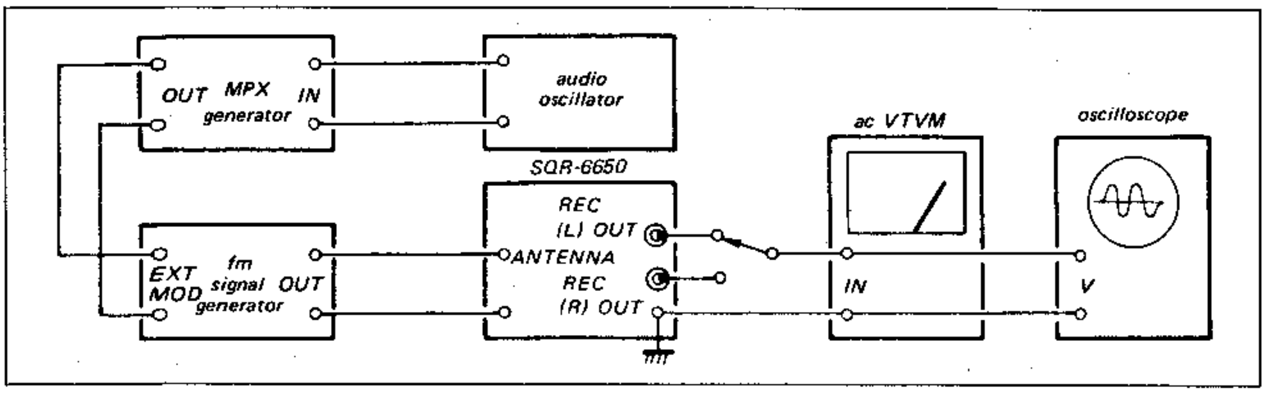


Fig. 3-13. Fm stereo separation adjustment test setup

3-4. A-M I-F STRIP ALIGNMENT

Preparation

Set the receiver FUNCTION switch to AM.

Note: To perform this alignment, the local oscillator should be killed. To do this, shunt the local oscillator trimmer capacitor CT402 with a 0.02μF ceramic capacitor as shown in Fig. 3-2.

Sweep Generator Method

Test Equipment Required

1. Sweep generator, 455 kHz.
2. Oscilloscope
3. Alignment tools

Procedure

1. Connect the sweep generator output directly to the AM EXT ANT terminal.
2. Connect the input cable of the oscilloscope with alligator clips to the connection point of R418 and R419 and ground on the fm (a-m) front-end/i-f amp/MPX board as shown in Fig. 3-14.
3. Set the sweep generator control as follows:

   Center frequency ....455 kHz
   Sweep width ....25 kHz
   Output ....as low as possible
4. With the equipment connected as shown in Fig. 3-15, adjust the oscilloscope controls and generator output to provide a visible indication.
5. Turn the top core of a-m IFT401 (see Fig. 3-10) to obtain a maximum and symmetrical response as shown in Fig. 3-16.

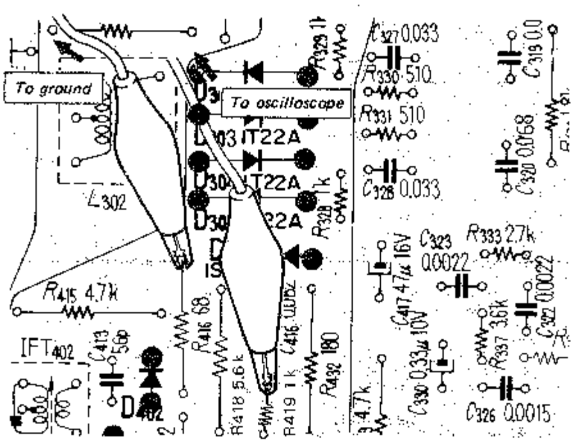


Fig. 3-14. A-m detector output connection

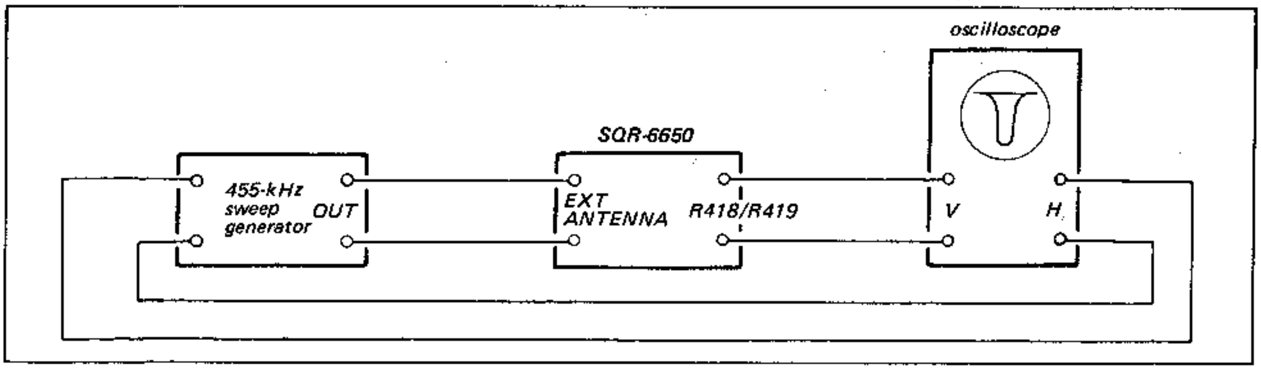


Fig. 3-15. A-m i-f alignment by sweep generator test setup

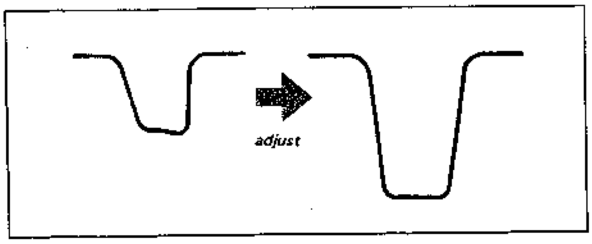


Fig. 3-16. A-m i-f response

Rf Signal Generator Method

Test Equipment Required

1. A-m signal generator
2. Oscilloscope
3. Alignment tools

Procedure

1. Set the rf signal generator controls as follows:

   Modulation .... INTERNAL
   Frequency .... 455 kHz
   OUTPUT level .... 1,000μV (60 dB)

2. Connect the rf signal generator output to the AM EXT ANT terminal.
3. With the equipment connected as shown in Fig. 3-17, turn the top core of a-m IFT401 (see Fig. 3-10) to obtain the maximum output.

3-5. A-M FREQUENCY COVERAGE AND TRACKING ALIGNMENT

Preparation

Set the FUNCTION switch to AM.

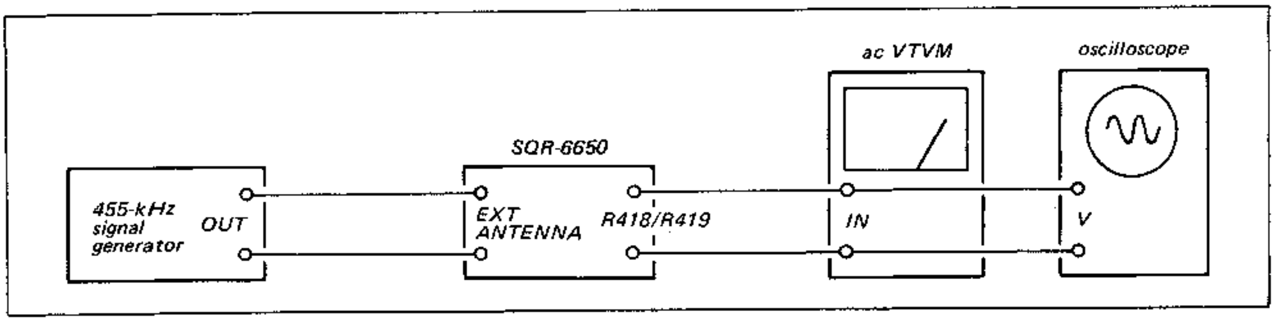


Fig. 3-17. A-m i-f alignment test setup by rf signal generator

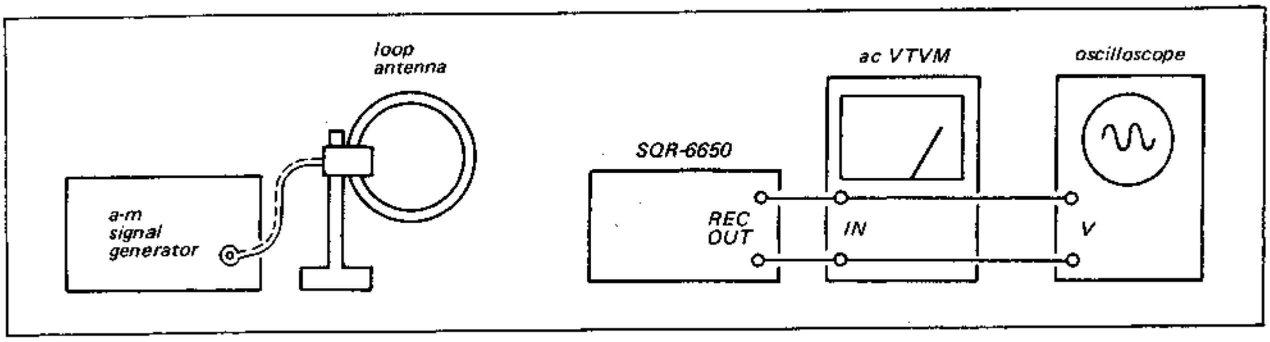


Fig. 3-18. A-m frequency coverage and tracking alignment test setup

Signal Generator Method

Test Equipment Required

1. Signal generator
2. Loop antenna
3. Ac VTVM

Procedure

With the equipment connected as shown in Fig. 3-18, follow the procedures given in Table 3-3.

Off-the-Air Signal Method

Accurate dial calibration, and a frequency-coverage and tracking test can also be performed by utilizing off-the-air local a-m signals. However, before performing the following procedure, be sure that the dial is mechanically calibrated.

3-6. SQ DECODER SECTION OPERATIONAL CHECK

1. Set the FUNCTION switch and the control as follows:
   FUNCTION switch .... AUX
   VOLUME control .... Minimum
2. With the equipment connected as shown in Fig. 3-19, apply a 1 kHz, -10 dB (0.245 V) signal to AUX, L-CH input and measure Lf' and Rf' output level (separation) at the check point on the SQ decoder board as shown in Fig. 3-20. Reference output level is as follows:
   Lf' = -10 dB Rf' = -24 ±1.5 dB
3. Apply a 1 kHz, -10 dB signal to both L-CH and R-CH AUX inputs simultaneously and measure Lf', Rf', Lb' and Rb' output levels (front-to-back separation) at the check point on the SQ decoder board as shown in Fig. 3-20. Reference output level is as follows:
   Lf', Rf' = -10 dB Lb', Rb' = -17 ±2.5 dB

   If necessary, check and repair the SQ decoder board.

TABLE 3-3. A-M FREQUENCY COVERAGE AND TRACKING ALIGNMENT

FREQUENCY COVERAGE ALIGNMENT					
Step	**SG Coupling**	**SG Frequency and Output Level**	**Tuner Dial Indication**	**Adjust**	**Indication**
1	Loop antenna	550 kHz 400 Hz 30% 10,000 μV (80 dB)	550 kHz	OSC coil L402 See Fig. 3-10.	Maximum VTVM reading
2	Loop antenna	1,600 kHz Same as above	1,600 kHz	OSC trimmer CT402 See Fig. 3-10.	Same as above
TRACKING ALIGNMENT					
1	Loop antenna	620 kHz 400 Hz 30% mod. Output level; as low as possible	Tune to the SG signal	Position of antenna coil L401 See Fig. 3-10.	Maximum VTVM reading
2	Loop antenna	1,400 kHz Same as above	Tune to the SG signal	Antenna trimmer CT401 See Fig. 3-10.	Same as above

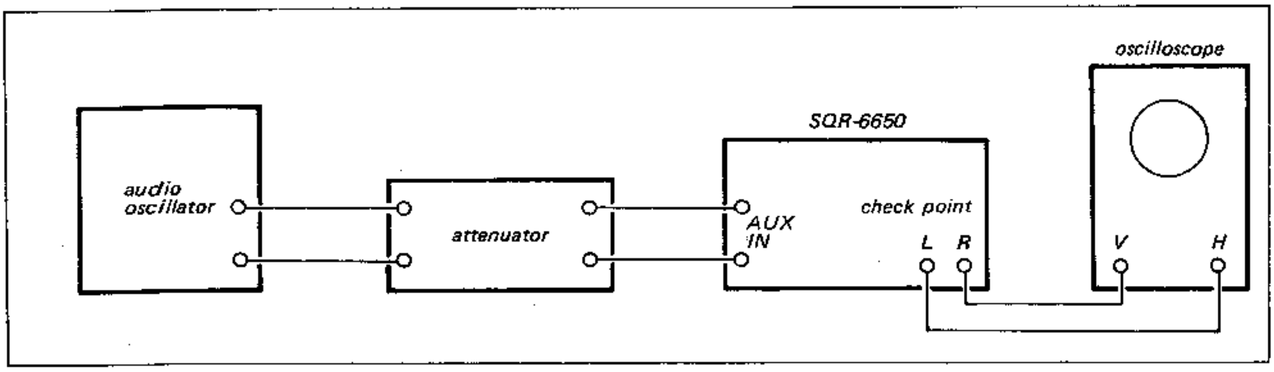


Fig. 3-19. SQ decoder section operational check test setup

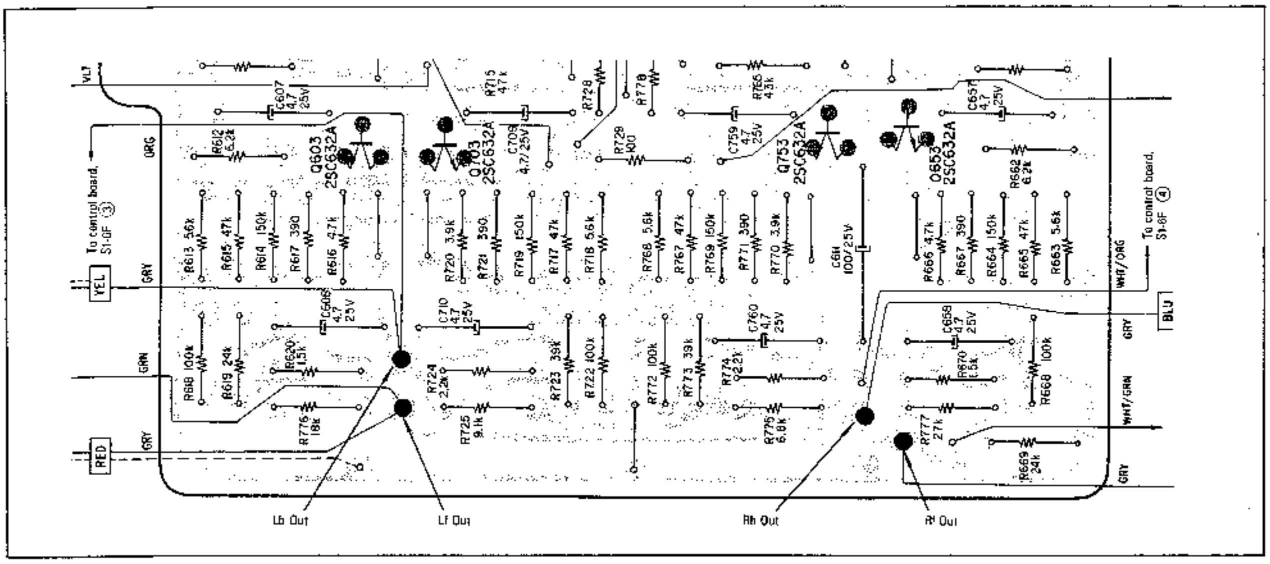


Fig. 3-20. SQ decoder section check point

3-7. CAUTION ON MEASUREMENT

DSD Output Stages

The SQR-6650 contains four power amplifiers. They are connected in pairs in what is called a "double-stacked differential" (DSD) output stage when the SYSTEM Selector is set to 2 CH. With this type of output system the R and L channel loads (be they speakers or resistors) are connected between the hot output terminals of the front- and back-channel output amplifiers during two-channel operation. Neither end of the load is grounded, both ends are hot. With speakers this requirement causes few problems; with your test setup, the story is different. If you connect your equipment in the normal manner to measure 2-channel power output, distortion, etc., you will blow the fuses in the back-channel amplifiers.

For 2-channel measurements, each load resistor must be completely floating (no ground connection, no common connecting leads). Check your load resistors with an ohmmeter; connect one ohmmeter lead to a resistor terminal, and touch the other lead to the other load resistors, to the test equipment ground terminals, and earth ground. If you get any reading below 1 megohm, you must remount and/or rewire your load resistors. Once your load resistors are made suitable for use, use one or more of the following techniques for your measurements.

1. **Floating Distortion Analyzer**–If you are using a Hewlett Packard Model 331A, 332A, 333A, or 334A Distortion Analyzer, remove the connecting link between the signal ground (⏊) and chassis ground (⏚) terminals, and connect the SQR-6650 and test equipment as shown in Fig. 3-21. Do not connect a scope (or anything else) to the distortion analyzer output.

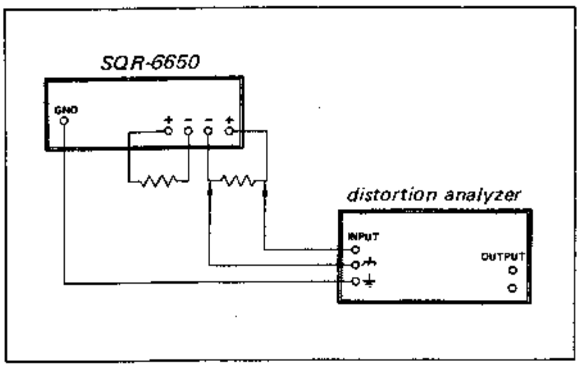


Fig. 3-21

2. **Differential Oscilloscope**–If your scope has a differential input facility, you can connect it as shown in Fig. 3-22 and measure the peak-to-peak output voltage at which clipping occurs. This technique is the least useful since you cannot determine the distortion under these conditions.

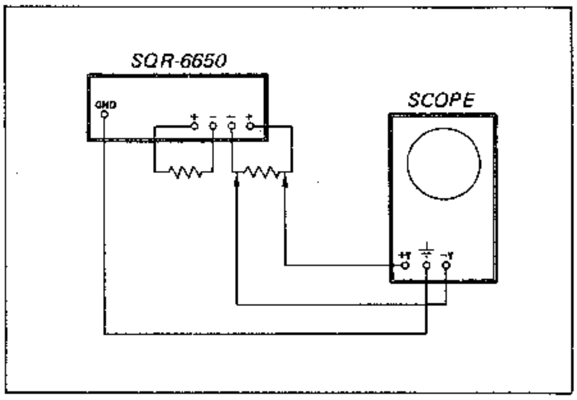


Fig. 3-22

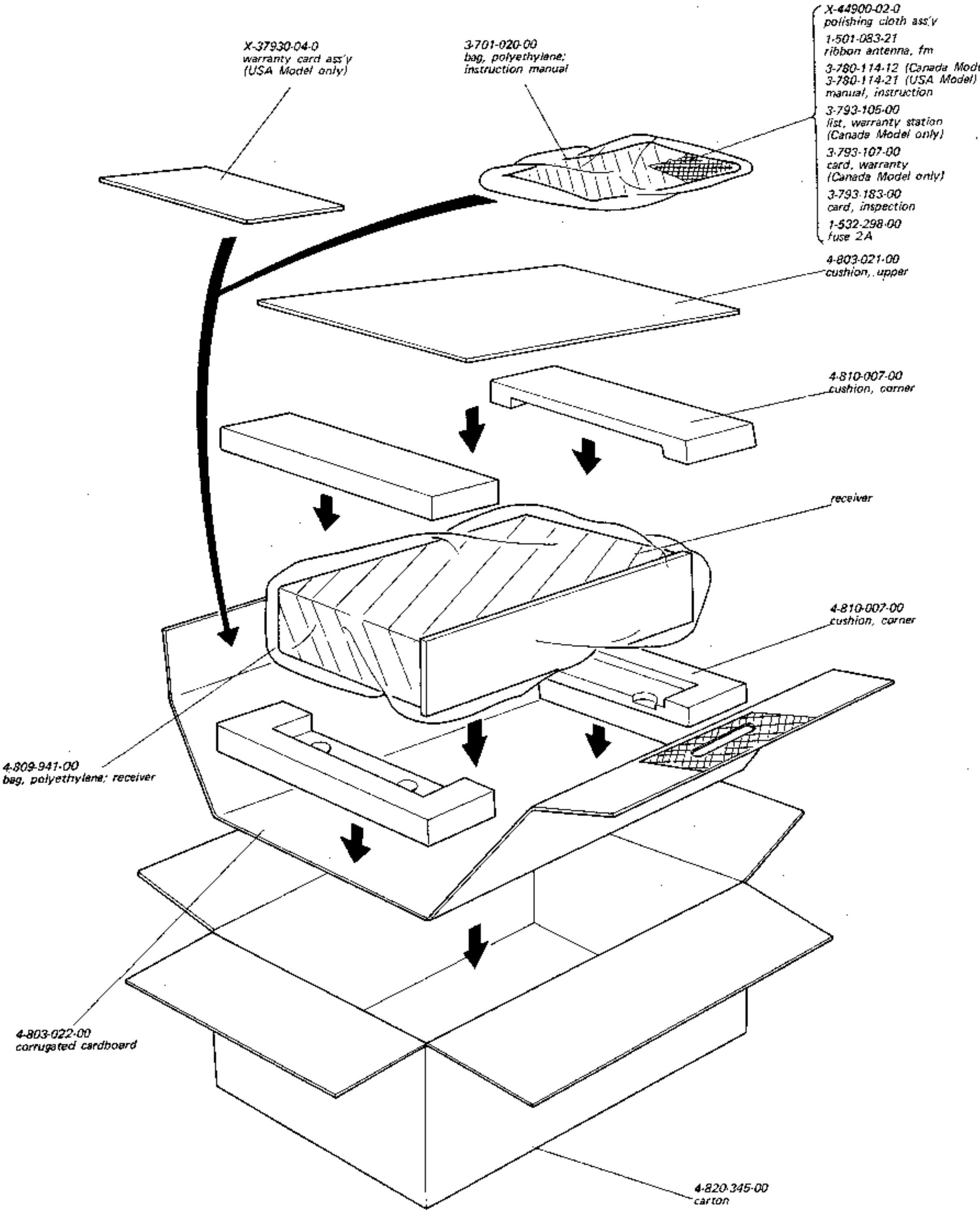
The standard measurement procedures which can be made with each of the preceding techniques are summarized in the following table. An X mark means the measurement procedure can be performed or determined.

Measurement Table

Measurement	Technique number	
	1	2
Power output	X	X
Harmonic distortion	X	
Power bandwidth	X	
Sensitivity	X	X
S/N ratio	X	
Frequency response	X	

SECTION 4
REPACKING

The SQR-6650 original shipping carton and packing materials are the ideal containers for shipping the unit. However to secure the maximum protection, the SQR-6650 must be repacked in these materials precisely as before. The proper repacking procedures are shown in Fig. 4-1.



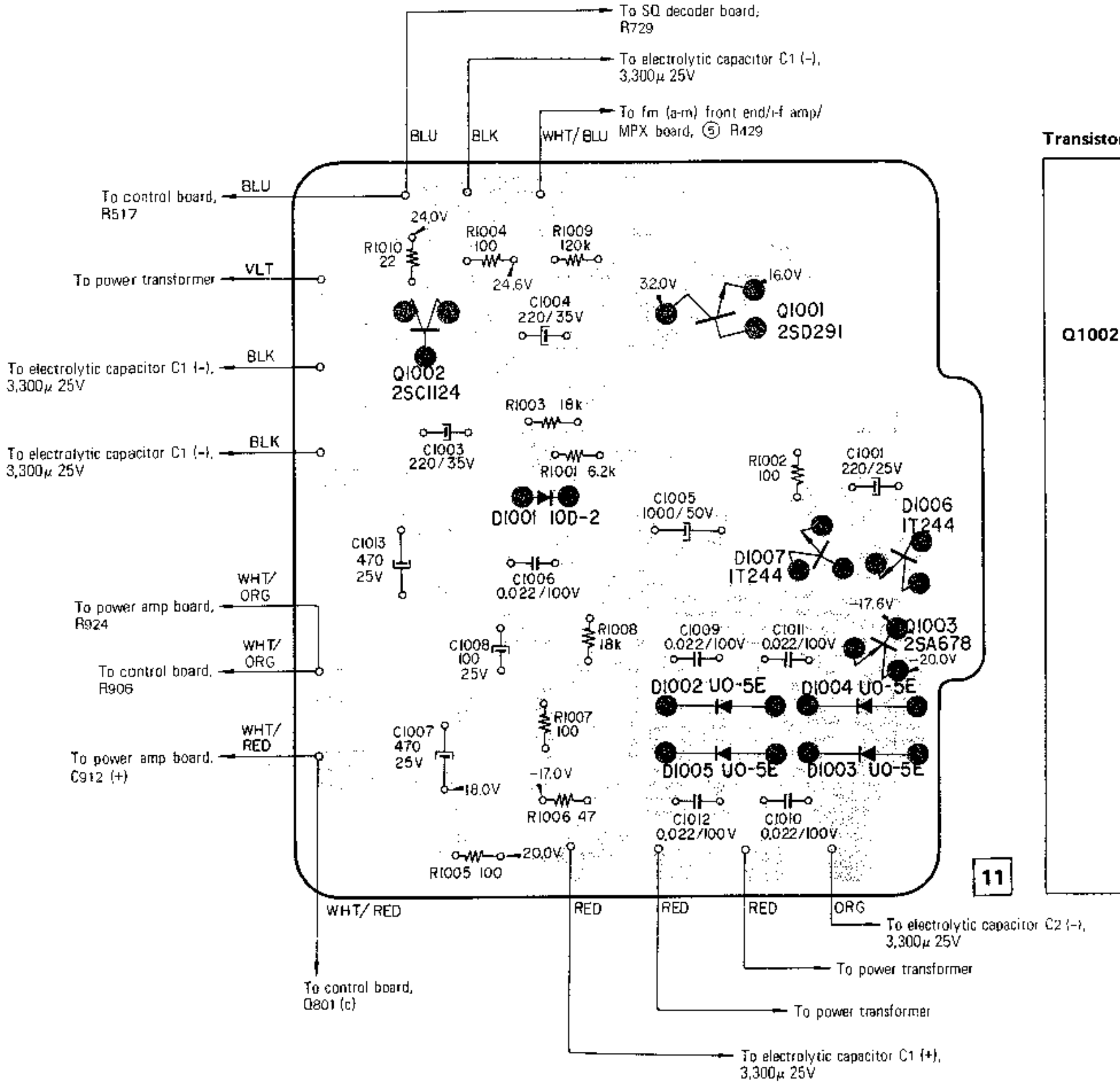
Note: Serial number applied to USA Model .... 800,001 and later
Serial number applied to Canada Model ... 700,001 and later

Fig. 4-1. Repacking

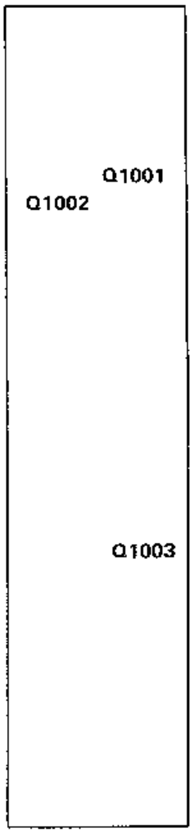
SECTION 5
DIAGRAMS

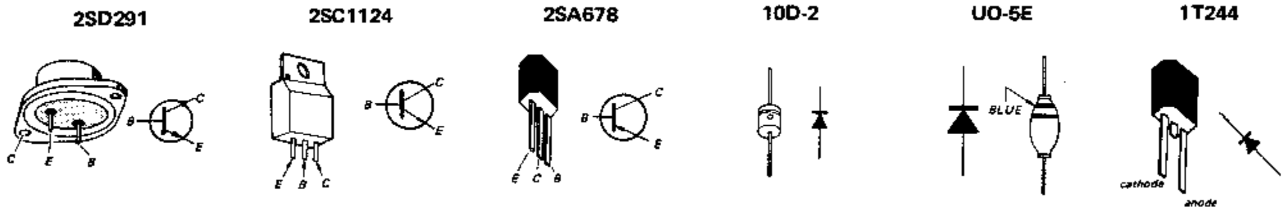
5-1. MOUNTING DIAGRAM – Power Supply Board –

– Conductor Side –



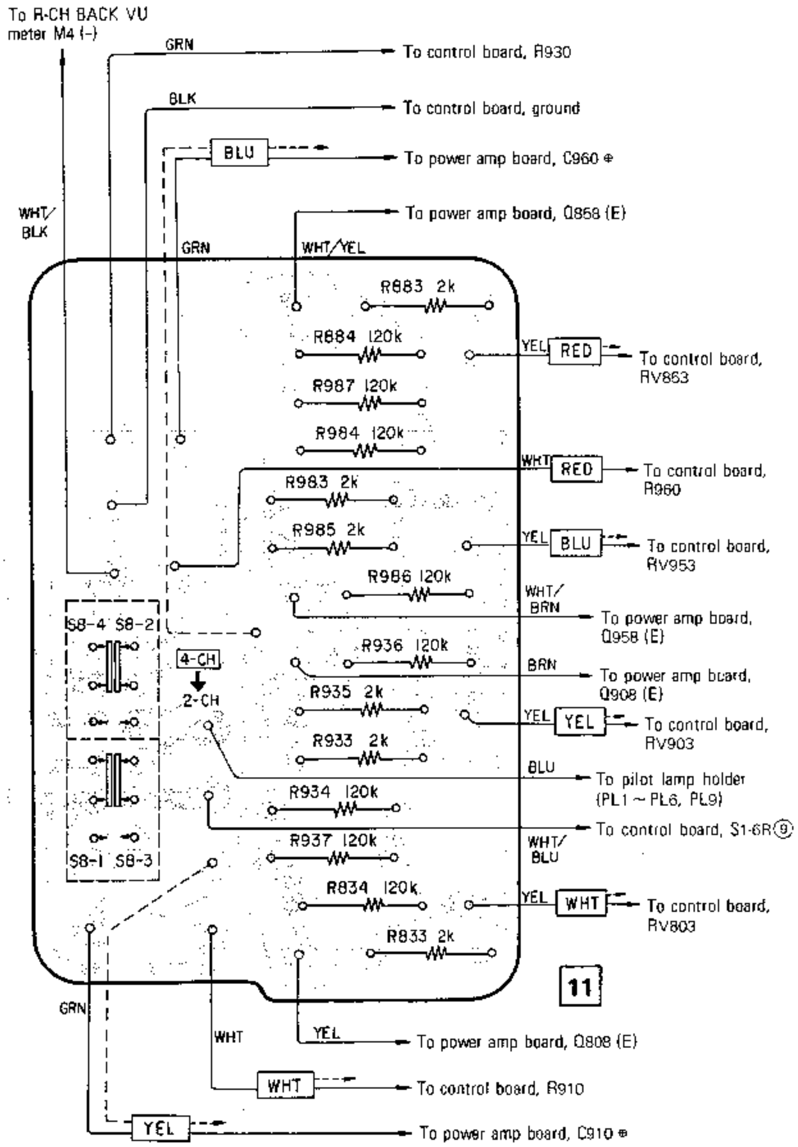
Transistor Location





5-2. MOUNTING DIAGRAM – 2-CH/4-CH Switch Board –

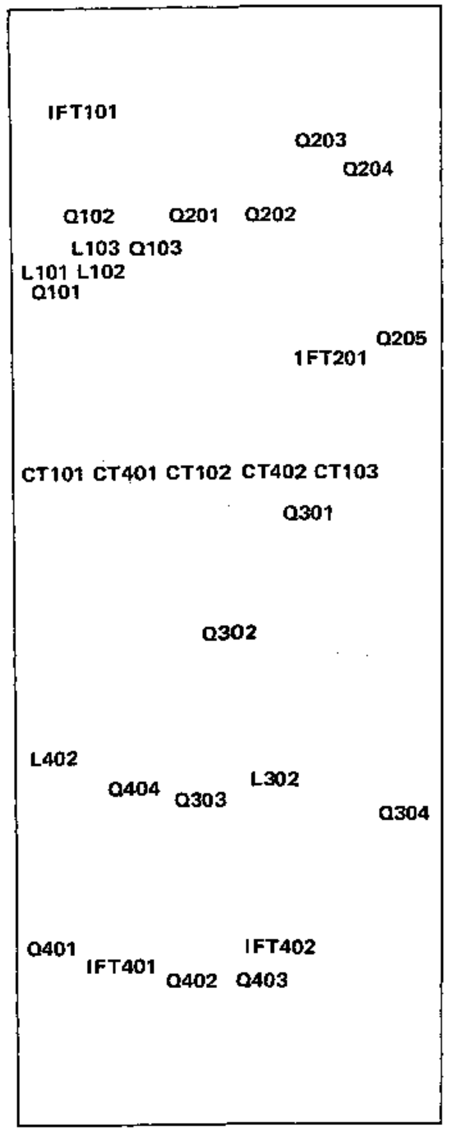
– Conductor Side –

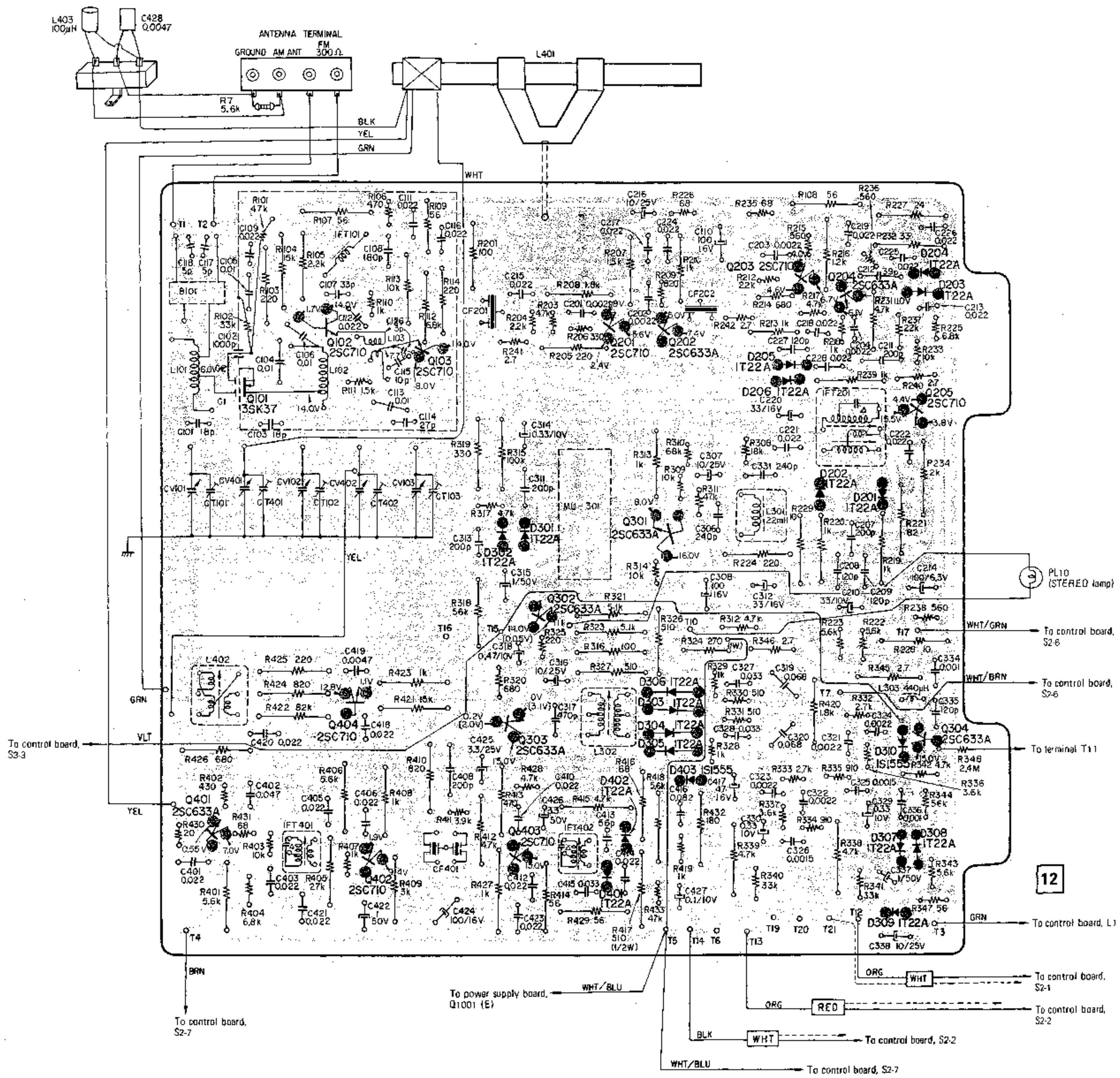


5-3. MOUNTING DIAGRAM – Fm (A-m) Front-End/I-f Amp/MPX Board –

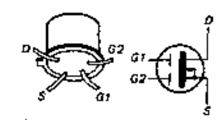
— Conductor Side —

Transistors and Adjustment Parts Location

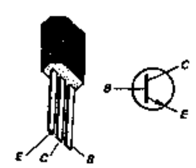




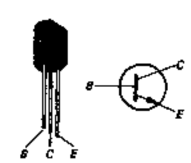
3SK37



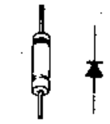
2SC633A



2SC710



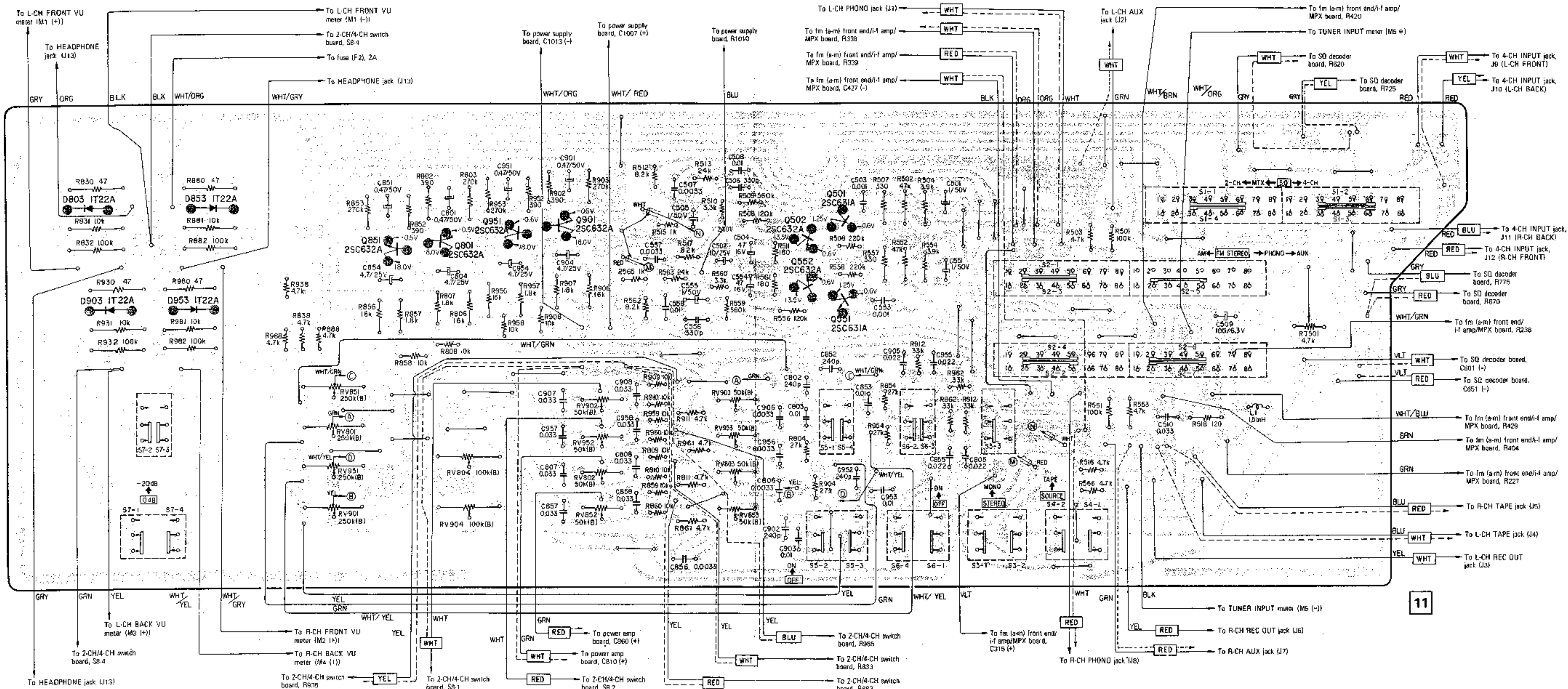
1T22A
1S1555



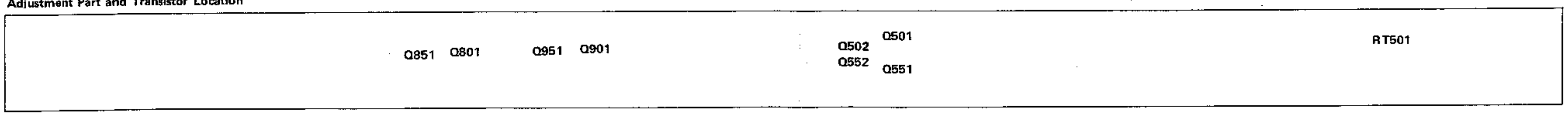
[ ] : STEREO operation

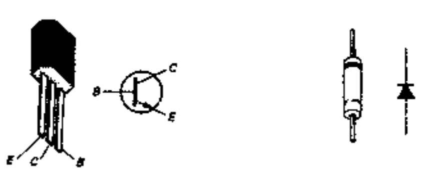
5-4. MOUNTING DIAGRAM – Control Board –

– Conductor Side –



Adjustment Part and Transistor Location

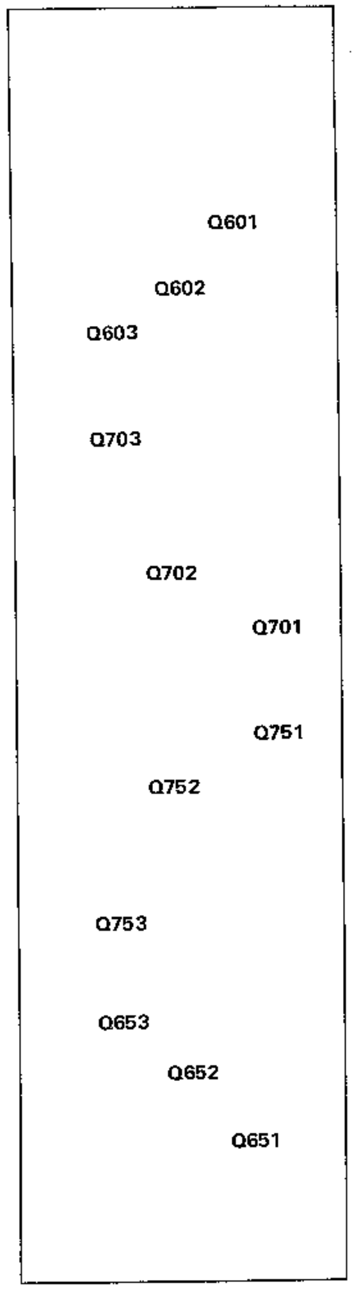


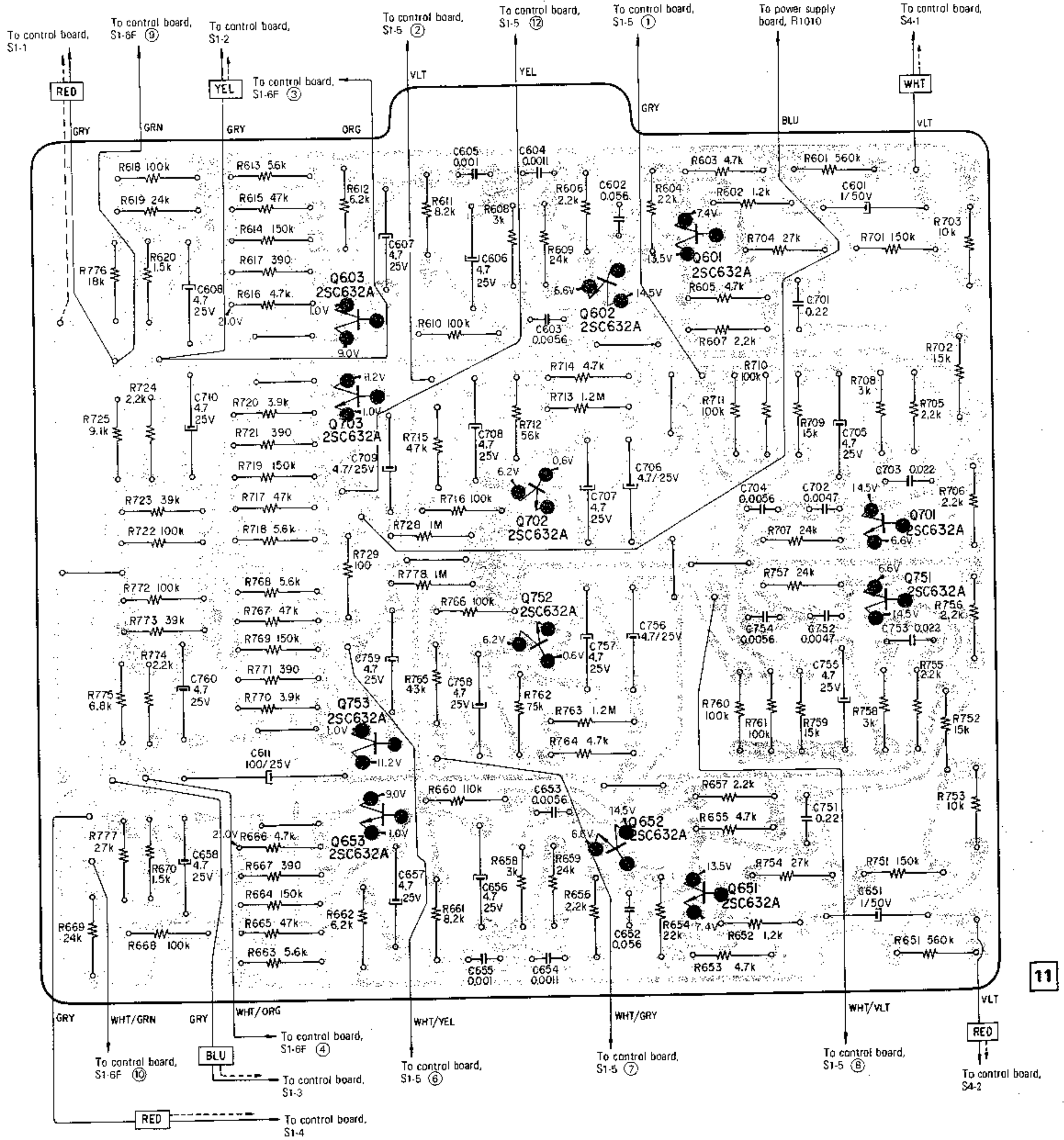


5-5. MOUNTING DIAGRAM – SQ Decoder Board –

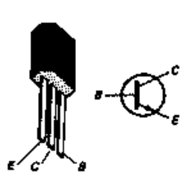
– Conductor Side –

Transistor Location



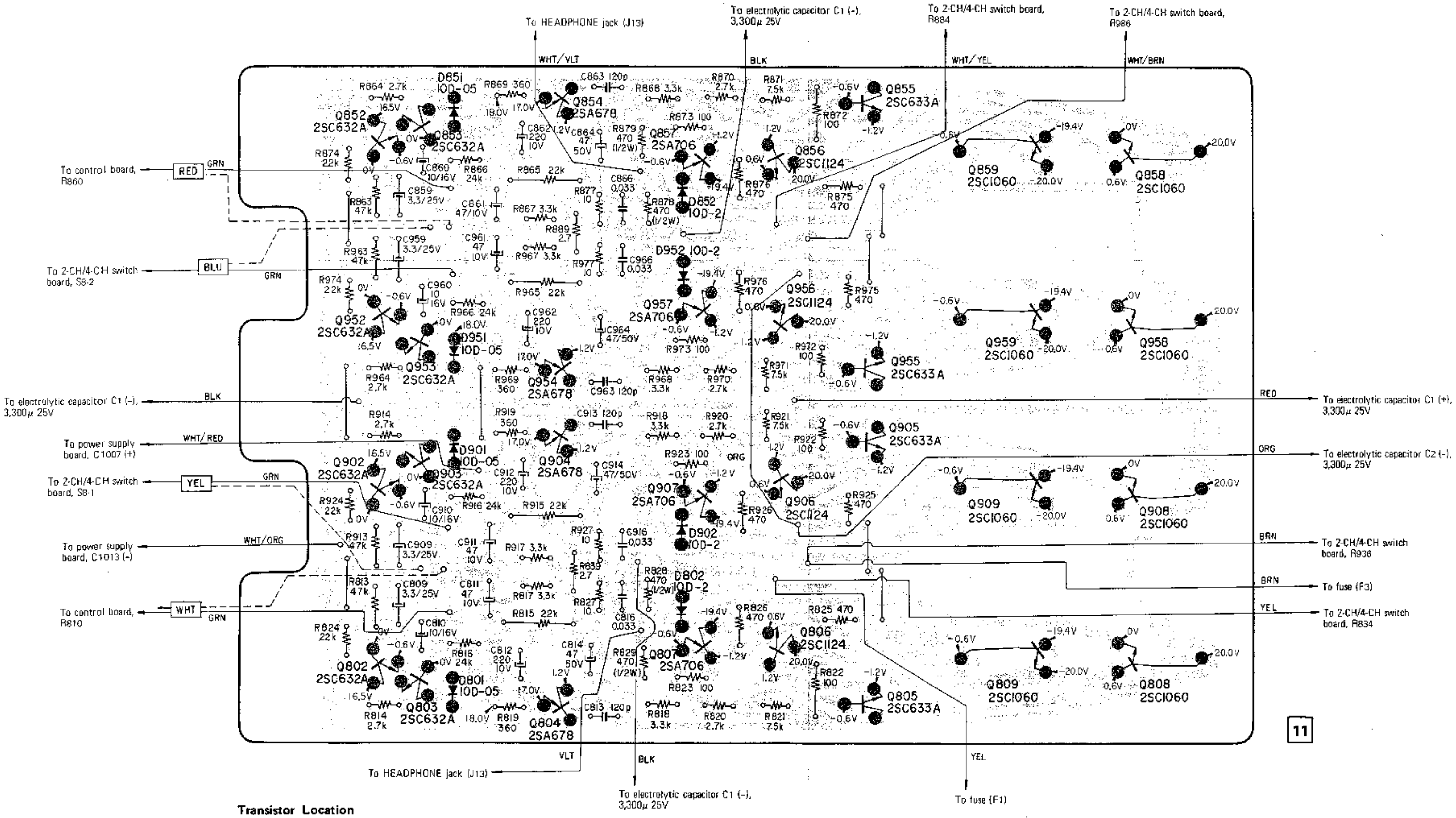


2SC632A



5-6. MOUNTING DIAGRAM – Power Amplifier Board –

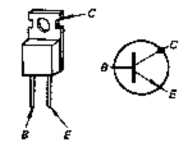
– Conductor Side –



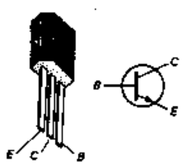
Transistor Location

Q852	Q853	Q854	Q857	Q856	Q855	Q859	Q858
Q952	Q953	Q954	Q957	Q956	Q955	Q959	Q958
Q902	Q903	Q904	Q907	Q906	Q905	Q909	Q908
Q802	Q803	Q804	Q807	Q806	Q805	Q809	Q808

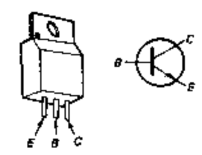
2SC1060



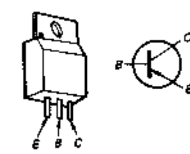
2SC632A
2SC633A



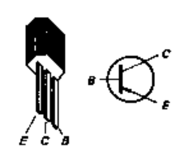
2SC1124



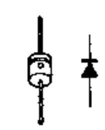
2SA706



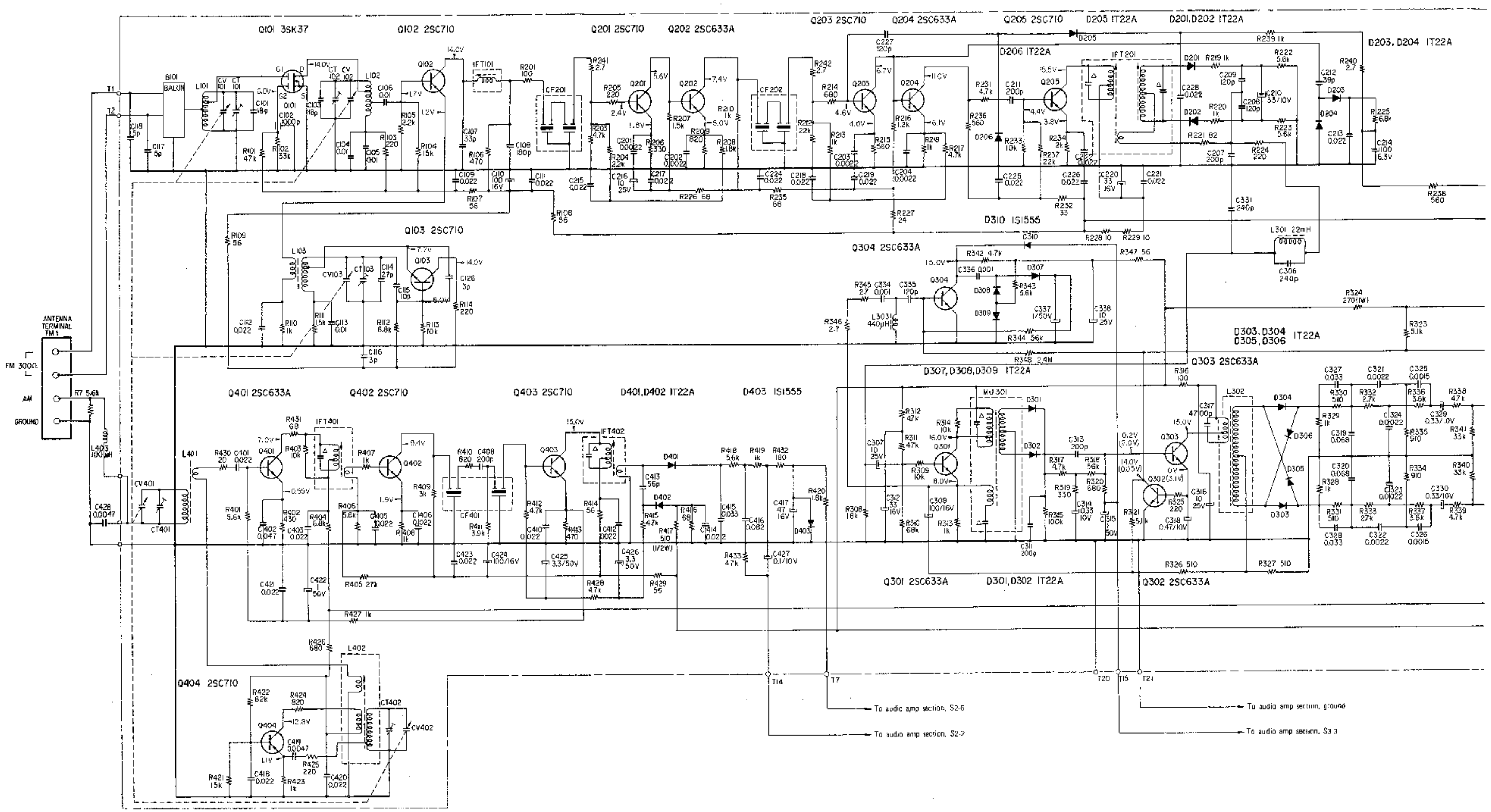
2SA678



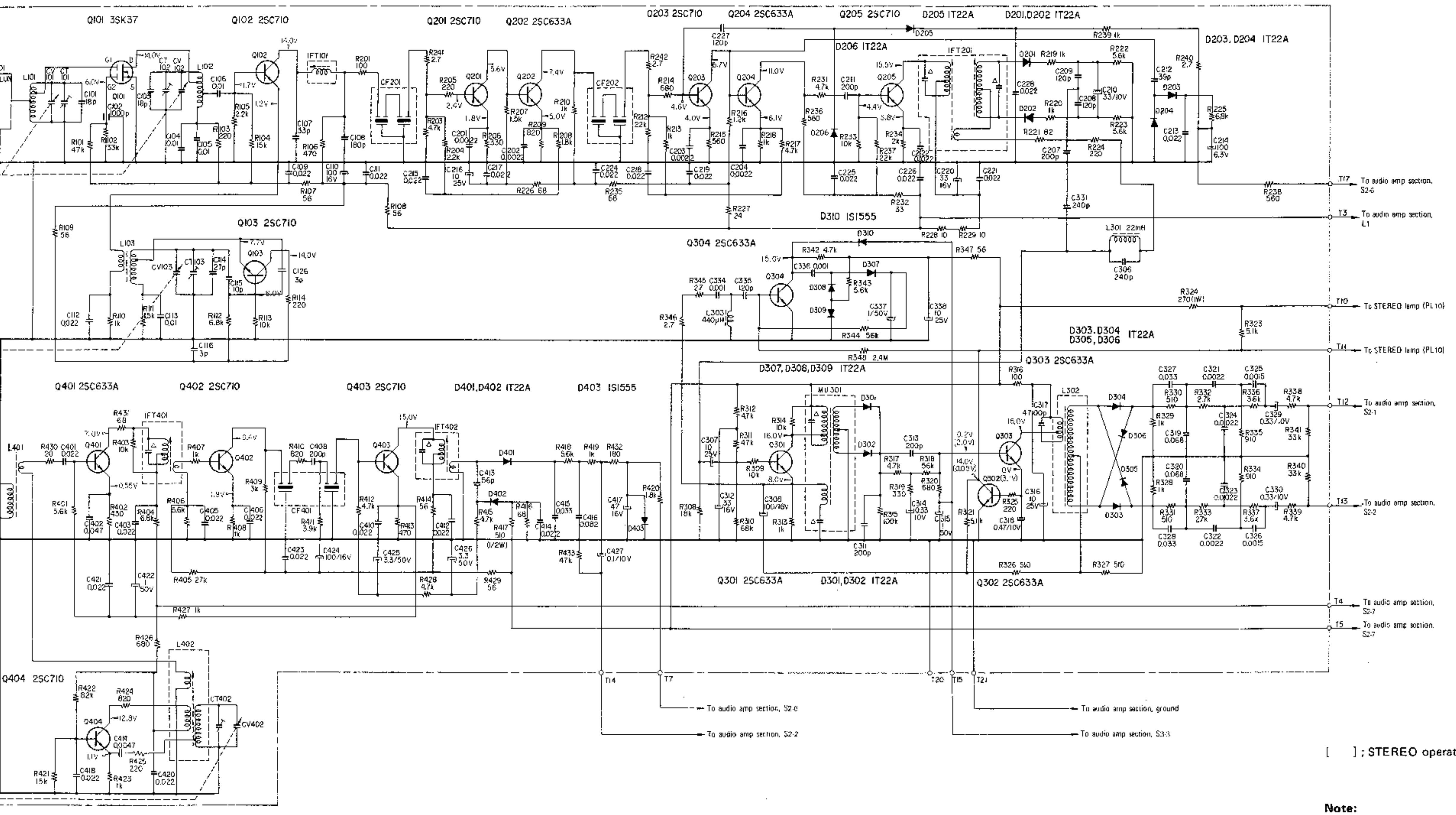
10D-05
10D-2



5-7. SCHEMATIC DIAGRAM — Fm (A-m) Front-End/I-f Amp/MPX Section —



p/MPX Section –

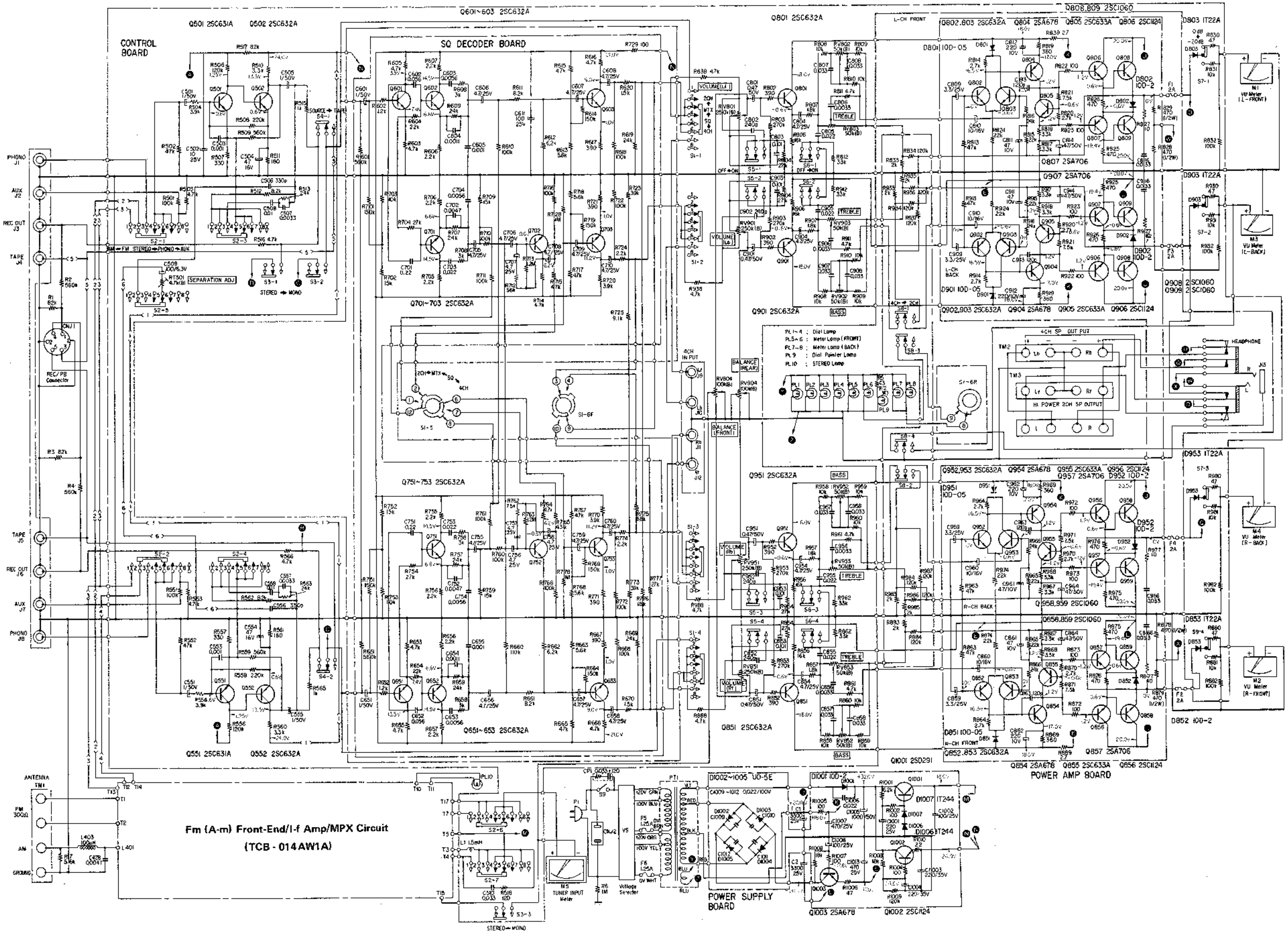


[ ] ; STEREO operation

Note:

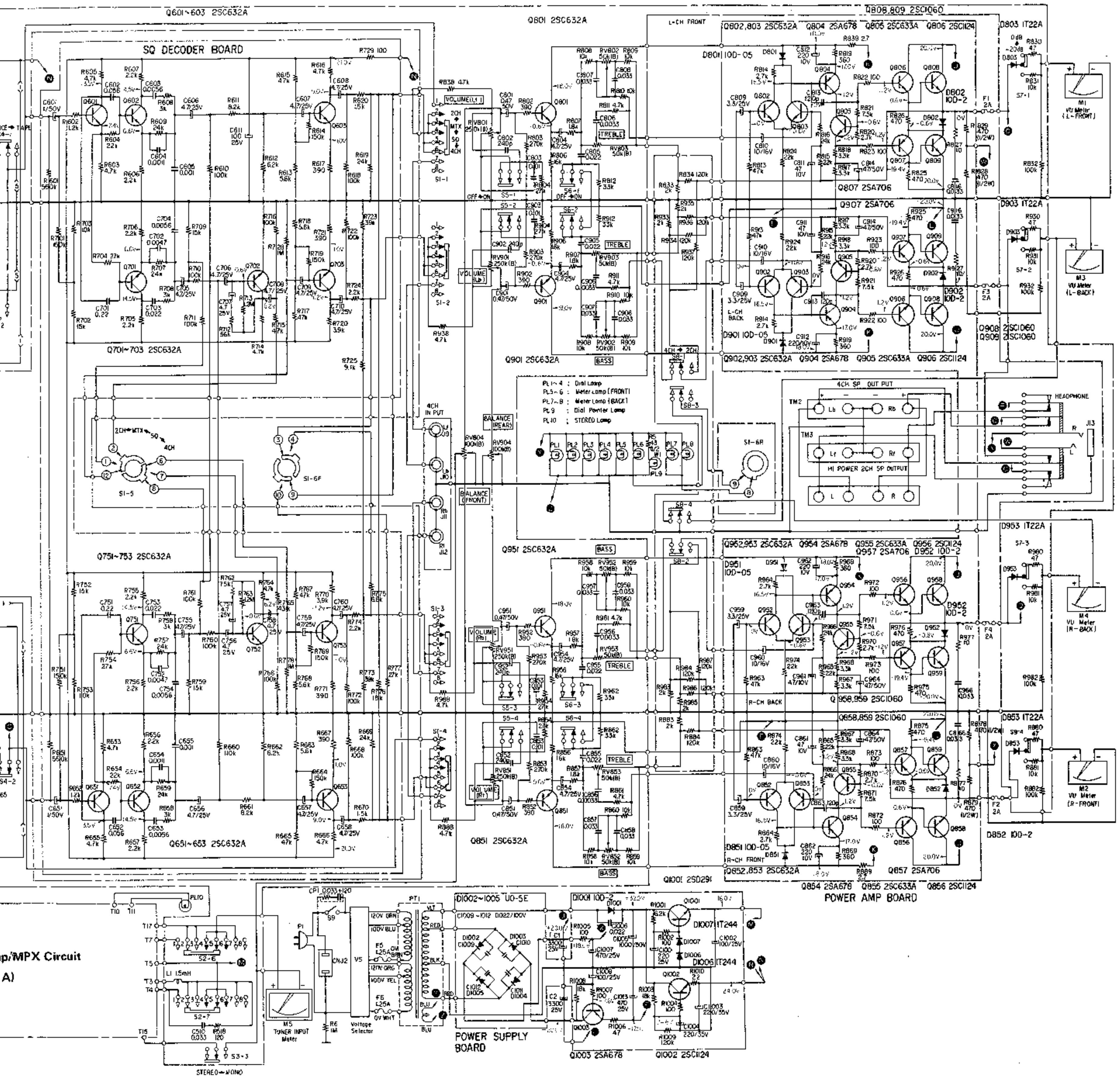
All resistance values are in ohms. k = 1,000, M = 1,000 k.
All capacitance values are in μF except as indicated with p, which means μμF.
All voltages are dc measured with a VOM which has an input impedance of 20 k ohms/volt. No signal in.
All voltages represent an average value.
Capacitors marked △ are built in transformer.

5-8. SCHEMATIC DIAGRAM — Audio Amp Section —



Ref. No.
S1-1 ~ 6
S2-1 ~ 7
S3-1 ~ 3
S4-1 ~ 2
S5-1 ~ 4
S6-1 ~ 4
S7-1 ~ 4
S8-1 ~ 4
S9

Note:
All resi
All cap
p, whic
All vol
input in
All volt



Ref. No.	Description	Position
S1-1 ~ 6	SYSTEM switch (2-CH-MTX-SQ-4-CH)	SQ
S2-1 ~ 7	FUNCTION switch (AM-FM STEREO-PHONO-AUX)	FM STEREO
S3-1 ~ 3	MODE switch (STEREO-MONO)	STEREO
S4-1 ~ 2	MONITOR switch (SOURCE-TAPE)	SOURCE
S5-1 ~ 4	LOUDNESS switch	OFF
S6-1 ~ 4	HI-FILTER switch	OFF
S7-1 ~ 4	METER level switch (0 dB ~ -20 dB)	0 dB
S8-1 ~ 4	2-CH/4-CH switch	4-CH
S9	POWER switch	OFF

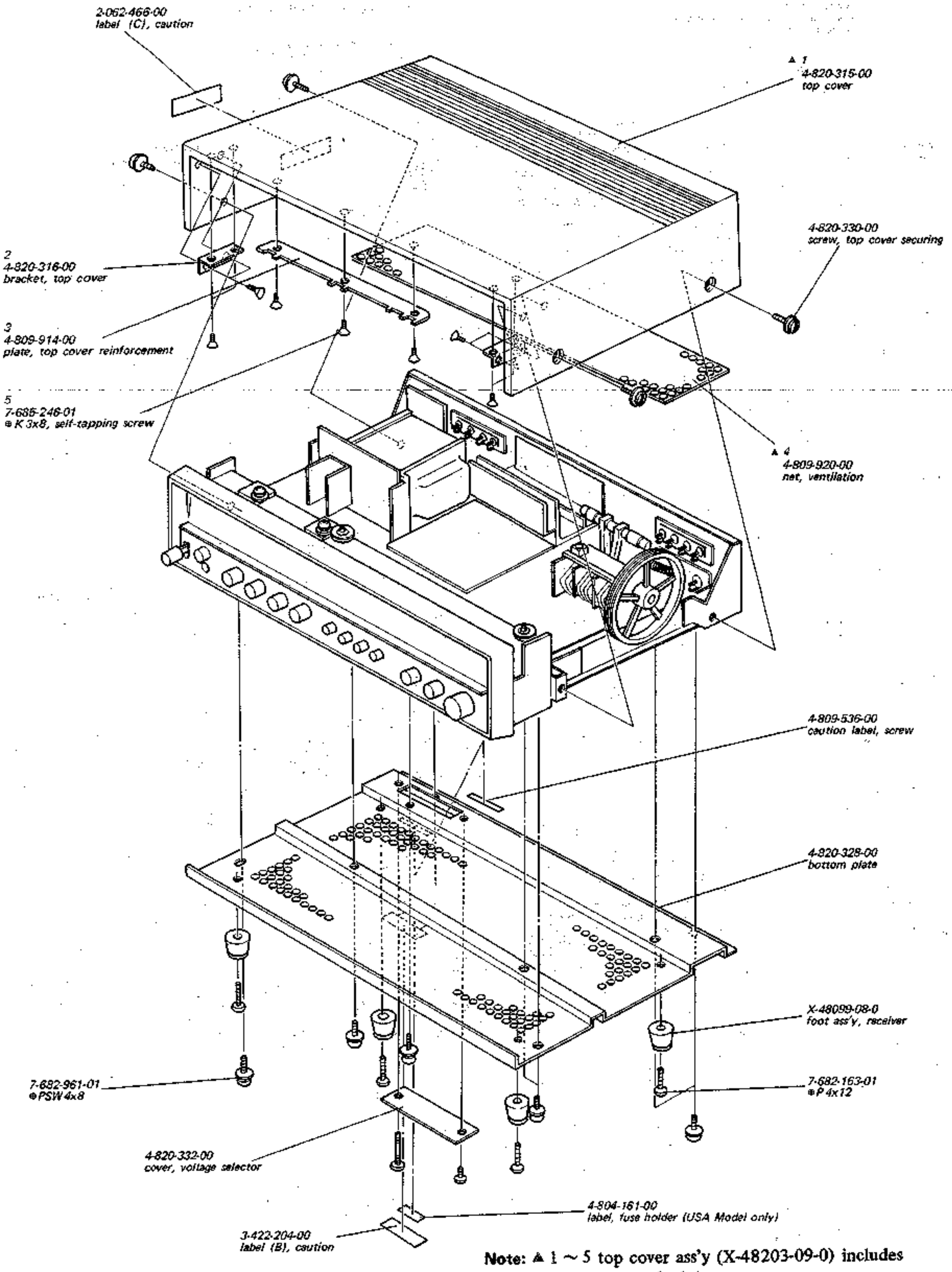
Note:

All resistance values are in ohms. k = 1,000, M = 1,000 k.
All capacitance values are in μF except as indicated with p, which means μμF.
All voltages are dc measured with a VOM which has an input impedance of 20 k ohms/volt. No signal in.
All voltages represent an average value.

SECTION 6
EXPLODED VIEWS

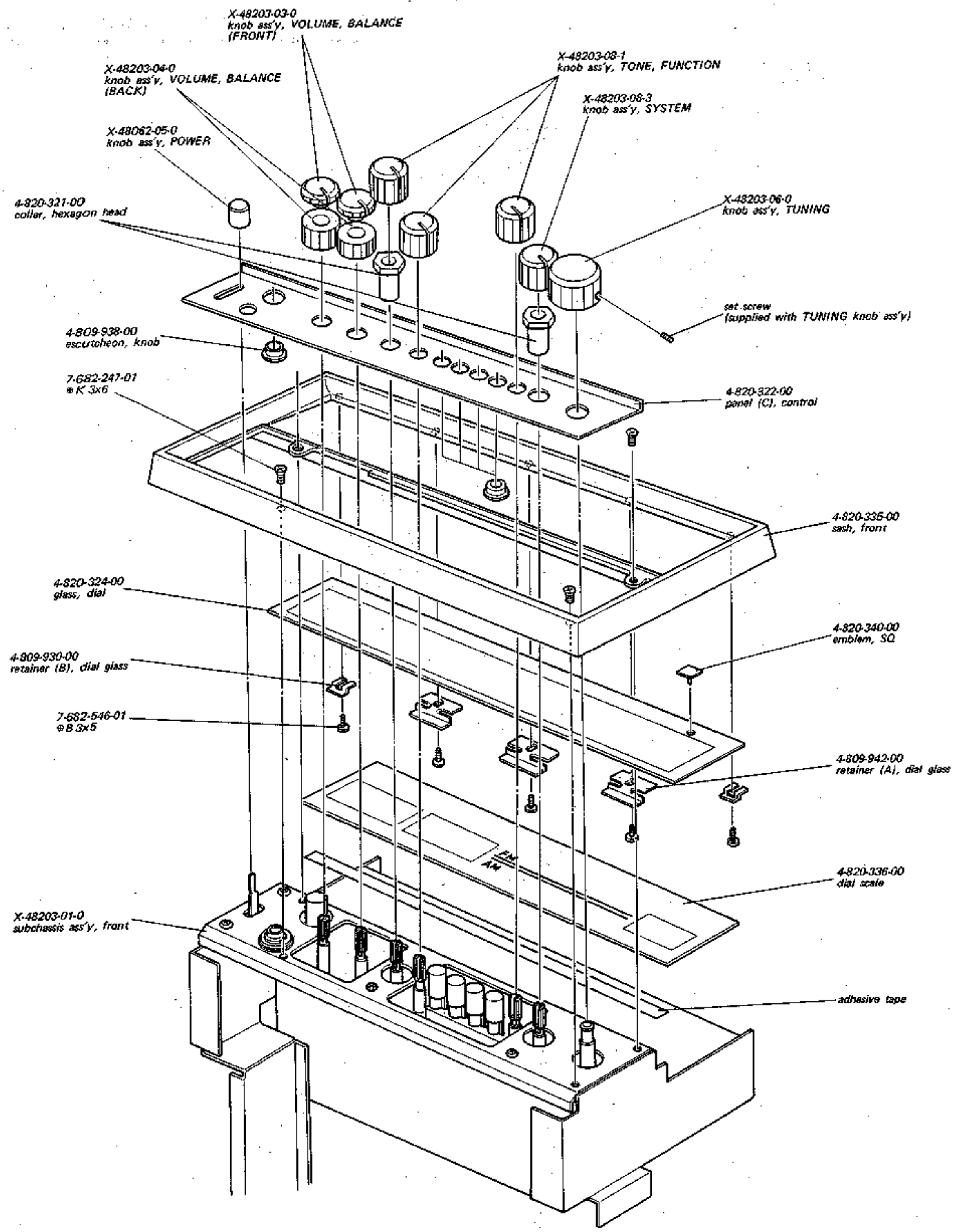
(1)

Note: Serial number applied to USA Model .... 800,001 and later
Serial number applied to Canada Model ... 700,001 and later



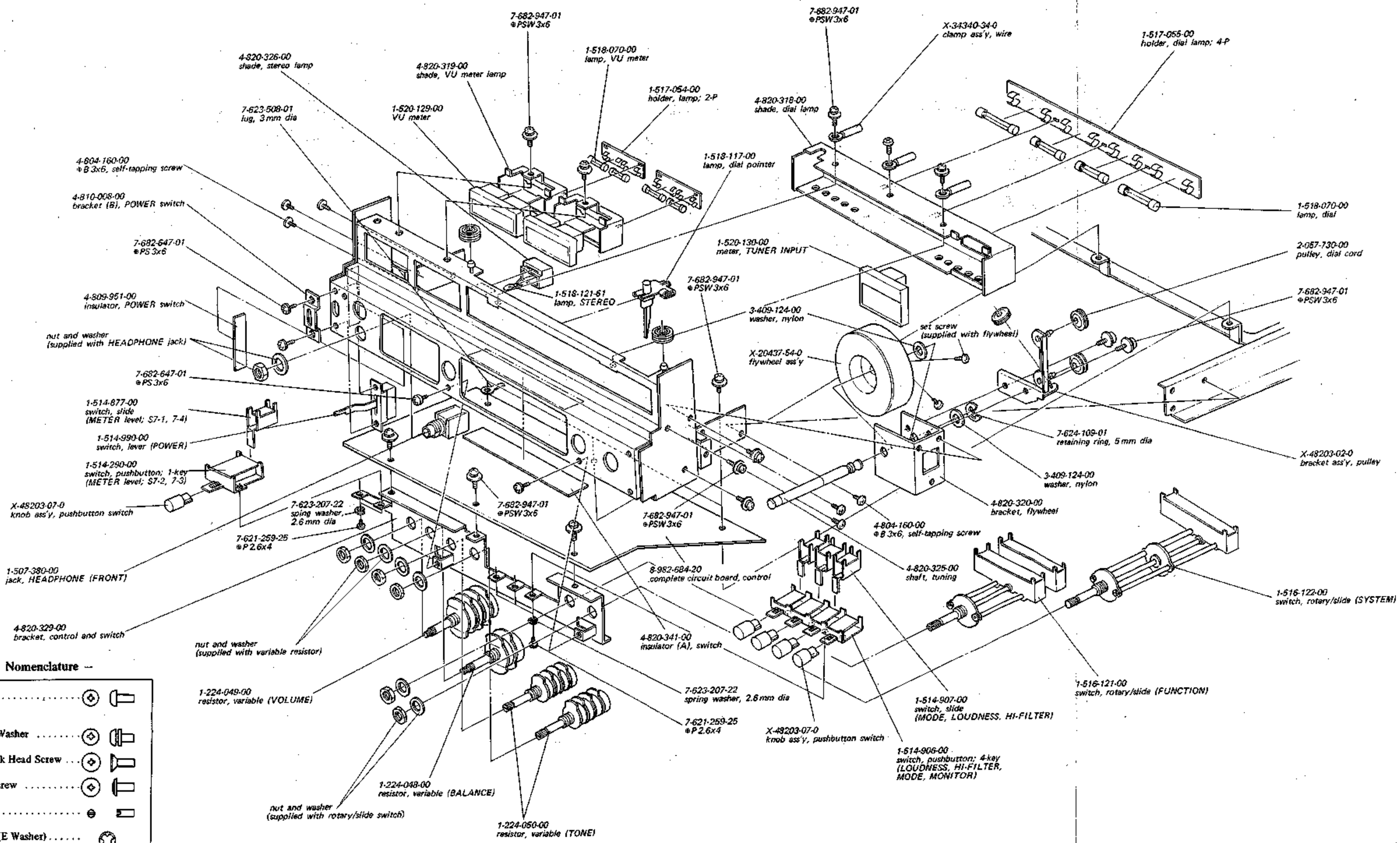
Note: ▲ 1 ~ 5 top cover ass'y (X-48203-09-0) includes all the parts marked ▲.

(2)


X-48203-03-0
knob ass'y, VOLUME, BALANCE (FRONT)
X-48203-04-0
knob ass'y, VOLUME, BALANCE (BACK)
X-48062-05-0
knob ass'y, POWER
X-48203-08-1
knob ass'y, TONE, FUNCTION
X-48203-08-3
knob ass'y, SYSTEM
X-48203-06-0
knob ass'y, TUNING
4-820-321-00
collar, hexagon head
set screw
(supplied with TUNING knob ass'y)
4-809-938-00
escutcheon, knob
7-682-247-01
⊕K 3x6
4-820-322-00
panel (C), control
4-820-335-00
sash, front
4-820-324-00
glass, dial
4-820-340-00
emblem, SQ
4-809-930-00
retainer (B), dial glass
7-682-546-01
⊕B 3x5
4-809-942-00
retainer (A), dial glass
4-820-336-00
dial scale
FM
AM
X-48203-01-0
subchassis ass'y, front
adhesive tape

 SQR-6650

(3)



– Hardware Nomenclature –

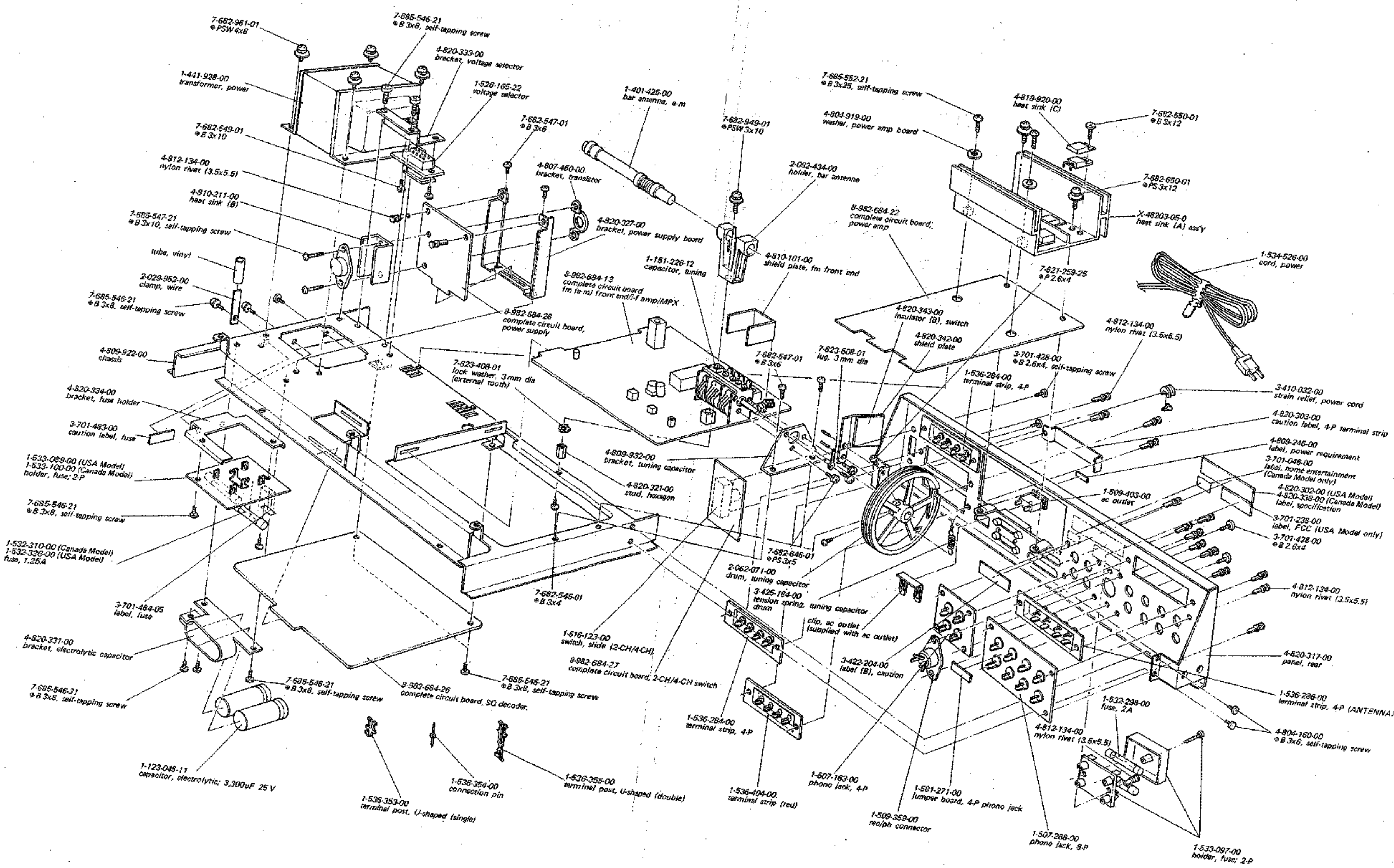
- P – Pan Head Screw ⊕
- PS – Pan Head Screw with Spring Washer ⊕
- K – Flat Countersunk Head Screw ⊕
- B – Binding Head Screw ⊕
- SC – Set Screw ⊖
- E – Retaining Ring (E Washer)

W – Washer
SW – Spring Washer
LW – Lock Washer
N – Nut

– Example –

⊕ P 3×10
- Type of Slot
- Length in mm (L)
- Diameter in mm (D)
- Type of Head

SQR-6650
SQR-6650



SECTION 7
ELECTRICAL PARTS LIST

Note: Serial number applied to USA Model .... 800,001 and later
Serial number applied to Canada Model ... 700,001 and later

Ref. No.	*Part No.*	*Description*	
	COMPLETE CIRCUIT BOARDS		
	8-982-684-13	fm (a-m) front-end/i-f amp/MPX (TCB-014AW1A)	
	8-982-684-22	power amplifier	
	8-982-684-20	control	
	8-982-684-26	SQ decoder	
	8-982-684-28	power supply	
	8-982-684-27	2-CH/4-CH switch	
	SEMICONDUCTORS		
D201		diode	1T22A
D202		diode	1T22A
D203		diode	1T22A
D204		diode	1T22A
D205		diode	1T22A
D206		diode	1T22A
D301		diode	1T22A
D302		diode	1T22A
D303		diode	1T22A
D304		diode	1T22A
D305		diode	1T22A
D306		diode	1T22A
D307		diode	1T22A
D308		diode	1T22A
D309		diode	1T22A
D310		diode	1S1555
D401		diode	1T22A
D402		diode	1T22A
D403		diode	1S1555
D801(D851) D901(D951)		diode	10D-05
D802(D852) D902(D952)		diode	10D-2
D803(D853) D903(D953)		diode	1T22A
D1001		diode	10D-2
D1002		diode	UO-5E
D1003		diode	UO-5E
D1004		diode	UO-5E
D1005		diode	UO-5E
D1006		diode	1T244
D1007		diode	1T244

Ref. No.	*Part No.*	*Description*	
Q101		FET	3SK37
Q102		transistor	2SC710
Q103		transistor	2SC710
Q201		transistor	2SC710
Q202		transistor	2SC633A
Q203		transistor	2SC710
Q204		transistor	2SC633A
Q205		transistor	2SC710
Q301		transistor	2SC633A
Q302		transistor	2SC633A
Q303		transistor	2SC633A
Q304		transistor	2SC633A
Q401		transistor	2SC633A
Q402		transistor	2SC710
Q403		transistor	2SC710
Q404		transistor	2SC710
Q501(Q551)		transistor	2SC631A
Q502(Q552)		transistor	2SC632A
Q601(Q651) Q701(Q751)		transistor	2SC632A
Q602(Q652) Q702(Q752)		transistor	2SC632A
Q603(Q653) Q703(Q753)		transistor	2SC632A
Q801(Q851) Q901(Q951)		transistor	2SC632A
Q802(Q852) Q902(Q952)		transistor	2SC632A
Q803(Q853) Q903(Q953)		transistor	2SC632A
Q804(Q854) Q904(Q954)		transistor	2SA678
Q805(Q855) Q905(Q955)		transistor	2SC633A
Q806(Q856) Q906(Q956)		transistor	2SC1124
Q807(Q857) Q907(Q957)		transistor	2SA706
Q808(Q858) Q908(Q958)		transistor	2SC1060
Q809(Q859) Q909(Q959)		transistor	2SC1060
Q1001		transistor	2SD291
Q1002		transistor	2SC1124

Ref. No.	Part No.	Description
Q1003		transistor 2SA678

TRANSFORMERS, COILS AND INDUCTORS

Ref. No.	Part No.	Description
B101	1-417-025-12	balun
IFT101	1-403-556-21	transformer, i-f; 10.7 MHz
IFT201	1-403-291-13	transformer, discriminator 10.7 MHz
IFT401	1-403-152-00	transformer, i-f; 455 kHz
IFT402	1-403-128-00	transformer, i-f; 455 kHz
L1	1-407-213-00	inductor, micro 1.5 mH
L101	1-401-476-00	coil, fm antenna
L102	1-425-710-00	coil, fm rf
L103	1-405-495-00	coil, fm osc
L301	1-407-418-00	coil, SCA trap 22 mH
L302	1-425-683-00	transformer, switching 38 kHz
L303	1-407-177-00	inductor, micro 440 μH
L401	1-401-425-00	bar antenna, a-m
L402	1-405-391-12	coil, a-m osc
L403	1-407-169-00	inductor, micro 100 μH
MU301	1-425-548-00	MPX unit
PT1	1-441-928-00	transformer, power

CAPACITORS

All capacitance values are in μF except as indicated with p, which means μμF.

Ref. No.	Part No.	Description			
C1	1-123-045-11	3,300		25 V	electrolytic
C2	1-123-045-11	3,300		25 V	electrolytic
C101	1-102-953-11	18p	±5%	50V	ceramic
C102	1-102-217-11	1,000p	$\pm^{100}_{0}$%	50V	ceramic
C103	1-102-953-11	18p	±5%	50V	ceramic
C104	1-101-118-11	0.01	±20%	50V	ceramic
C105	1-101-118-11	0.01	±20%	50V	ceramic
C106	1-101-923-11	0.01	$\pm^{80}_{20}$%	25 V	ceramic
C107	1-102-963-11	33p	±5%	50V	ceramic
C108	1-102-982-11	180p	±10%	50V	ceramic
C109	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C110	1-121-415-11	100		16V	electrolytic
C111	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C112	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C113	1-101-118-11	0.01	±20%	50V	ceramic
C114	1-102-806-11	27p	±5%	50V	ceramic
C115	1-102-947-11	10p	±5%	50V	ceramic
C116	1-102-862-11	3p	±0.25 pF	50V	ceramic
C117	1-102-942-11	5p	±0.5 pF	50V	ceramic
C118	1-102-942-11	5p	±0.5 pF	50V	ceramic
C119		---------------			
C126	1-102-862-11	3p	±0.25 pF	50V	ceramic
C201	1-101-919-11	0.0022	$\pm^{80}_{20}$%	25 V	ceramic
C202	1-101-919-11	0.0022	$\pm^{80}_{20}$%	25 V	ceramic
C203	1-101-919-11	0.0022	$\pm^{80}_{20}$%	25 V	ceramic
C204	1-101-919-11	0.0022	$\pm^{80}_{20}$%	25 V	ceramic
C205		---------------			
C206		---------------			
C207	1-102-977-11	200p	±5%	50V	ceramic
C208	1-101-340-11	120p	±10%	50V	ceramic
C209	1-101-340-11	120p	±10%	50V	ceramic
C210	1-121-402-11	33		10V	electrolytic
C211	1-102-977-11	200p	±5%	50V	ceramic
C212	1-102-965-11	39p	±5%	50V	ceramic
C213	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C214	1-121-413-11	100		6.3 V	electrolytic
C215	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C216	1-121-398-11	10		25 V	electrolytic
C217	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C218	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C219	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C220	1-121-403-11	33		16V	electrolytic
C221	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C222	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C223		---------------			
C224	1-102-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C225	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C226	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C227	1-101-340-11	120p	±10%	50V	ceramic
C228	1-101-924-11	0.022	$\pm^{80}_{20}$%	25 V	ceramic
C306	1-107-140-11	240p	±10%	50V	silvered mica
C307	1-121-398-11	10		25 V	electrolytic
C308	1-121-415-11	100		16V	electrolytic
C309		---------------			
C310		---------------			
C311	1-102-977-11	200p	±5%	50V	ceramic
C312	1-121-403-11	33		16V	electrolytic
C313	1-102-977-11	200p	±5%	50V	ceramic
C314	1-127-021-11	0.33		10V	solid aluminum
C315	1-121-391-11	1		50V	electrolytic
C316	1-121-398-11	10		25 V	electrolytic
C317	1-103-575-11	4,700p	±5%	50V	styrol
C318	1-127-022-11	0.47		10V	solid aluminum
C319	1-105-683-12	0.068	±10%	50V	mylar
C320	1-105-683-12	0.068	±10%	50V	mylar
C321	1-105-665-12	0.0022	±10%	50V	mylar
C322	1-105-665-12	0.0022	±10%	50V	mylar
C323	1-105-665-12	0.0022	±10%	50V	mylar
C324	1-105-665-12	0.0022	±10%	50V	mylar
C325	1-105-663-12	0.0015	±10%	50V	mylar
C326	1-105-663-12	0.0015	±10%	50V	mylar

Ref. No.	Part No.	Description			
C327	1-105-679-12	0.033	±10%	50V	mylar
C328	1-105-679-12	0.033	±10%	50V	mylar
C329	1-127-021-11	0.33		10V	solid aluminum
C330	1-127-021-11	0.33		10V	solid aluminum
C331	1-107-140-11	240p	±10%	50V	silvered mica
C332		---------------			
C333		---------------			
C334	1-105-661-12	0.001	±10%	50V	mylar
C335	1-101-340-11	120p	±10%	50V	ceramic
C336	1-105-661-12	0.001	±10%	50V	mylar
C337	1-121-391-11	1		50V	electrolytic
C338	1-121-398-11	10		25V	electrolytic
C401	1-101-924-11	0.022	$\pm^{80}_{20}$%	25V	ceramic
C402	1-105-681-12	0.047	±10%	50V	mylar
C403	1-101-924-11	0.022	$\pm^{80}_{20}$%	25V	ceramic
C404		---------------			
C405	1-101-924-11	0.022	$\pm^{80}_{20}$%	25V	ceramic
C406	1-101-924-11	0.022	$\pm^{80}_{20}$%	25V	ceramic
C407		---------------			
C408	1-103-708-11	200p	±5%	50V	styrol
C409		---------------			
C410	1-105-677-12	0.022	±10%	50V	mylar
C411		---------------			
C412	1-101-924-11	0.022	$\pm^{80}_{20}$%	25V	ceramic
C413	1-101-884-11	56p	±5%	50V	ceramic
C414	1-101-924-11	0.022	$\pm^{80}_{20}$%	25V	ceramic
C415	1-105-679-12	0.033	±10%	50V	mylar
C416	1-105-684-12	0.082	±10%	50V	mylar
C417	1-121-409-11	47		16V	electrolytic
C418	1-101-924-11	0.022	$\pm^{80}_{20}$%	25V	ceramic
C419	1-105-669-12	0.0047	±10%	50V	mylar
C420	1-101-924-11	0.022	$\pm^{80}_{20}$%	25V	ceramic
C421	1-101-924-11	0.022	$\pm^{80}_{20}$%	25V	ceramic
C422	1-121-391-11	1		50V	electrolytic
C423	1-101-924-11	0.022	$\pm^{80}_{20}$%	25V	ceramic
C424	1-121-415-11	100		16V	electrolytic
C425	1-121-393-11	3.3		50V	electrolytic
C426	1-121-393-11	3.3		50V	electrolytic
C427	1-127-019-11	0.1		10V	solid aluminum
C428	1-105-669-12	0.0047	±10%	50V	mylar
C501(C551)	1-121-912-11	1		50V	electrolytic
C502	1-121-398-11	10		25V	electrolytic
C503(C553)	1-105-661-12	0.001	±10%	50V	mylar
C504(C554)	1-121-409-11	47		16V	electrolytic
C505(C555)	1-121-912-11	1		50V	electrolytic
C506(C556)	1-102-820-11	330p	±5%	50V	ceramic
C507(C557)	1-105-667-12	0.0033	±10%	50V	mylar
C508(C558)	1-105-673-12	0.01	±10%	50V	mylar

Ref. No.	Part No.	Description			
C509	1-121-413-11	100		6.3V	electrolytic
C510	1-105-679-12	0.033	±10%	50V	mylar
C601(C651)	1-119-367-11	1		50V	electrolytic
C602(C652)	1-108-597-12	0.056	±5%	50V	mylar
C603(C653)	1-108-573-12	0.0056	±5%	50V	mylar
C604(C654)	1-108-556-12	0.0011	±5%	50V	mylar
C605(C655)	1-108-555-12	0.001	±5%	50V	mylar
C606(C656)	1-119-363-11	4.7		25V	electrolytic
C607(C657)	1-119-363-11	4.7		25V	electrolytic
C608(C658)	1-119-363-11	4.7		25V	electrolytic
C609		---------------			
C610		---------------			
C611	1-119-171-11	100		25V	electrolytic
C701(C751)	1-105-689-12	0.22	±10%	50V	mylar
C702(C752)	1-108-571-12	0.0047	±5%	50V	mylar
C703(C753)	1-108-587-12	0.022	±5%	50V	mylar
C704(C754)	1-108-573-12	0.0056	±5%	50V	mylar
C705(C755)	1-119-363-11	4.7		25V	electrolytic
C706(C756)	1-119-363-11	4.7		25V	electrolytic
C707(C757)	1-119-363-11	4.7		25V	electrolytic
C708(C758)	1-119-363-11	4.7		25V	electrolytic
C709(C759)	1-119-363-11	4.7		25V	electrolytic
C710(C760)	1-119-363-11	4.7		25V	electrolytic
C801(C851) C901(C951)	1-121-911-11	0.47		50V	electrolytic
C802(C852) C902(C952)	1-102-979-11	240p	±5%	50V	ceramic
C803(C853) C903(C953)	1-105-673-12	0.01	±10%	50V	mylar
C804(C854) C904(C954)	1-121-915-11	4.7		25V	electrolytic
C805(C855) C905(C955)	1-105-677-12	0.022	±10%	50V	mylar
C806(C856) C906(C956)	1-105-667-12	0.0033	±10%	50V	mylar
C807(C857) C907(C957)	1-105-679-12	0.033	±10%	50V	mylar
C808(C858) C908(C958)	1-105-679-12	0.033	±10%	50V	mylar
C809(C859) C909(C959)	1-121-392-11	3.3		25V	electrolytic
C810(C860) C910(C960)	1-121-651-11	10		16V	electrolytic
C811(C861) C911(C961)	1-121-352-11	47		10V	electrolytic
C812(C862) C912(C962)	1-121-420-11	220		10V	electrolytic
C813(C863) C913(C963)	1-102-816-11	120p	±5%	50V	ceramic

Ref. No.	Part No.	Description			
C814(C864) C914(C964)	1-121-411-11	47		50V	electrolytic
C816(C866) C916(C966)	1-105-679-12	0.033	±10%	50V	mylar
C1001	1-121-936-11	220		25V	electrolytic
C1002	1-121-416-11	100		25V	electrolytic
C1003	1-121-063-11	220		35V	electrolytic
C1004	1-121-063-11	220		35V	electrolytic
C1005	1-123-046-11	1,000		50V	electrolytic
C1006	1-105-717-12	0.022	±10%	100V	mylar
C1007	1-121-940-11	470		25V	electrolytic
C1008	1-121-935-11	100		25V	electrolytic
C1009	1-105-717-12	0.022	±10%	100V	mylar
C1010	1-105-717-12	0.022	±10%	100V	mylar
C1011	1-105-717-12	0.022	±10%	100V	mylar
C1012	1-105-717-12	0.022	±10%	100V	mylar
C1013	1-121-940-11	470		25V	electrolytic
CT101, 102, 103 401, 402 CV101, 102, 103 401, 402	1-151-226-12	capacitor, tuning			

RESISTORS

All resistance values are in Ω, ±5%, ¼W and carbon type unless otherwise indicated.

Ref. No.	Part No.	Description			
R1	1-244-719-11	82k			
R2	1-244-739-11	560k			
R3	1-244-719-11	82k			
R4	1-244-739-11	560k			
R5	1-202-540-11	43	±10%	½W	composition
R6	1-202-645-11	1M	±10%	½W	composition
R7	1-244-691-11	5.6k			
R101	1-244-713-11	47k			
R102	1-244-709-11	33k			
R103	1-244-657-11	220			
R104	1-244-701-11	15k			
R105	1-244-681-11	2.2k			
R106	1-242-665-11	470			
R107	1-244-643-11	56			
R108	1-244-643-11	56			
R109	1-244-643-11	56			
R110	1-242-673-11	1k			

Ref. No.	Part No.	Description
R111	1-242-677-11	1.5k
R112	1-244-693-11	6.8k
R113	1-244-697-11	10k
R114	1-244-657-11	220
R201	1-244-649-11	100
R202		--------------
R203	1-242-689-11	4.7k
R204	1-242-681-11	2.2k
R205	1-244-657-11	220
R206	1-242-661-11	330
R207	1-244-677-11	1.5k
R208	1-244-679-11	1.8k
R209	1-242-671-11	820
R210	1-244-673-11	1k
R211		--------------
R212	1-242-705-11	22k
R213	1-242-673-11	1k
R214	1-242-669-11	680
R215	1-242-667-11	560
R216	1-244-675-11	1.2k
R217	1-242-689-11	4.7k
R218	1-242-673-11	1k
R219	1-244-673-11	1k
R220	1-244-673-11	1k
R221	1-244-647-11	82
R222	1-242-691-11	5.6k
R223	1-242-691-11	5.6k
R224	1-244-657-11	220
R225	1-242-693-11	6.8k
R226	1-242-645-11	68
R227	1-244-634-11	24
R228	1-244-625-11	10
R229	1-244-625-11	10
R230		--------------
R231	1-244-689-11	4.7k
R232	1-244-637-11	33
R233	1-242-697-11	10k
R234	1-244-680-11	2k
R235	1-242-645-11	68
R236	1-242-667-11	560
R237	1-242-705-11	22k
R238	1-242-667-11	560
R239	1-244-673-11	1k
R240	1-242-611-11	2.7
R241	1-242-611-11	2.7
R242	1-242-611-11	2.7
R308	1-242-703-11	18k
R309	1-242-697-11	10k
R310	1-242-717-11	68k
R311	1-242-713-11	47k

Ref. No.	Part No.	Description			
R312	1-242-689-11	4.7 k			
R313	1-244-673-11	1 k			
R314	1-242-697-11	10 k			
R315	1-244-721-11	100 k			
R316	1-244-649-11	100			
R317	1-242-689-11	4.7 k			
R318	1-244-715-11	56 k			
R319	1-244-661-11	330			
R320	1-242-669-11	680			
R321	1-244-690-11	5.1 k			
R322		--------------			
R323	1-244-690-11	5.1 k			
R324	1-209-216-11	270	±10%	1W	carbon
R325	1-242-657-11	220			
R326	1-244-666-11	510			
R327	1-244-666-11	510			
R328	1-242-673-11	1 k			
R329	1-242-673-11	1 k			
R330	1-242-666-11	510			
R331	1-242-666-11	510			
R332	1-242-683-11	2.7 k			
R333	1-242-683-11	2.7 k			
R334	1-242-672-11	910			
R335	1-242-672-11	910			
R336	1-242-686-11	3.6 k			
R337	1-242-686-11	3.6 k			
R338	1-244-689-11	4.7 k			
R339	1-244-689-11	4.7 k			
R340	1-242-709-11	33 k			
R341	1-242-709-11	33 k			
R342	1-242-689-11	4.7 k			
R343	1-242-691-11	5.6 k			
R344	1-242-715-11	56 k			
R345	1-244-611-11	2.7			
R346	1-242-611-11	2.7			
R347	1-242-643-11	56			
R348	1-202-654-11	2.4 M	±5%	½W	composition
R401	1-244-691-11	5.6 k			
R402	1-242-664-11	430			
R403	1-242-697-11	10 k			
R404	1-242-693-11	6.8 k			
R405	1-244-707-11	27 k			
R406	1-244-691-11	5.6 k			
R407	1-242-673-11	1 k			
R408	1-244-673-11	1 k			
R409	1-244-684-11	3 k			
R410	1-244-671-11	820			
R411	1-242-687-11	3.9 k			
R412	1-244-689-11	4.7 k			
R413	1-244-665-11	470			
R414	1-244-643-11	56			
R415	1-244-689-11	4.7 k			
R416	1-244-645-11	68			
R417	1-202-566-11	510	±10%	½W	composition
R418	1-244-691-11	5.6 k			
R419	1-242-673-11	1 k			
R420	1-244-679-11	1.8 k			
R421	1-244-701-11	15 k			
R422	1-244-719-11	82 k			
R423	1-244-673-11	1 k			
R424	1-244-671-11	820			
R425	1-244-657-11	220			
R426	1-244-669-11	680			
R427	1-244-673-11	1 k			
R428	1-242-689-11	4.7 k			
R429	1-244-643-11	56			
R430	1-242-632-11	20			
R431	1-242-645-11	68			
R432	1-244-655-11	180			
R433	1-242-713-11	47 k			
R501(R551)	1-242-721-11	100 k			
R502(R552)	1-242-713-11	47 k			
R503(R553)	1-242-689-11	4.7 k			
R504(R554)	1-242-687-11	3.9 k			
R505(R555)		--------------			
R506(R556)	1-242-723-11	120 k			
R507(R557)	1-242-661-11	330			
R508(R558)	1-242-729-11	220 k			
R509(R559)	1-242-739-11	560 k			
R510(R560)	1-242-685-11	3.3 k			
R511(R561)	1-242-655-11	180			
R512(R562)	1-242-695-11	8.2 k			
R513(R563)	1-242-706-11	24 k			
R514(R564)		--------------			
R515(R565)	1-242-673-11	1 k			
R516(R566)	1-242-689-11	4.7 k			
R517	1-242-719-11	82 k			
R518	1-242-651-11	120			
R601(R651)	1-244-739-11	560 k			
R602(R652)	1-244-675-11	1.2 k			
R603(R653)	1-244-689-11	4.7 k			
R604(R654)	1-244-705-11	22 k			
R605(R655)	1-244-689-11	4.7 k			
R606(R656)	1-244-681-11	2.2 k			
R607(R657)	1-244-681-11	2.2 k			
R608(R658)	1-244-684-11	3 k			
R609(R659)	1-244-706-11	24 k			
R610	1-244-721-11	100 k			
R660	1-244-722-11	110 k			
R611(R661)	1-244-695-11	8.2 k			
R612(R662)	1-244-692-11	6.2 k			

Ref. No.	Part No.	Description			
R613(R663)	1-244-691-11	5.6 k			
R614(R664)	1-244-725-11	150 k			
R615(R665)	1-244-713-11	47 k			
R616(R666)	1-244-689-11	4.7 k			
R617(R667)	1-244-663-11	390			
R618(R668)	1-244-721-11	100 k			
R619(R669)	1-244-706-11	24 k			
R620(R670)	1-244-677-11	1.5 k			
R701(R751)	1-244-725-11	150 k			
R702(R752)	1-244-701-11	15 k			
R703(R753)	1-244-697-11	10 k			
R704(R754)	1-244-707-11	27 k			
R705(R755)	1-244-681-11	2.2 k			
R706(R756)	1-244-681-11	2.2 k			
R707(R757)	1-244-706-11	24 k			
R708(R758)	1-244-684-11	3 k			
R709(R759)	1-244-701-11	15 k			
R710(R760)	1-244-721-11	100 k			
R711(R761)	1-244-721-11	100 k			
R712	1-244-715-11	56 k			
R762	1-244-718-11	75 k			
R713(R763)	1-202-457-11	1.2 M	±5%	¼W	composition
R714(R764)	1-244-689-11	4.7 k			
R715	1-244-713-11	47 k			
R765	1-244-712-11	43 k			
R716(R766)	1-244-721-11	100 k			
R717(R767)	1-244-713-11	47 k			
R718(R768)	1-244-691-11	5.6 k			
R719(R769)	1-244-725-11	150 k			
R720(R770)	1-244-687-11	3.9 k			
R721(R771)	1-244-663-11	390			
R722(R772)	1-244-721-11	100 k			
R723(R773)	1-244-711-11	39 k			
R724(R774)	1-244-681-11	2.2 k			
R725	1-244-696-11	9.1 k			
R775	1-244-693-11	6.8 k			
R776	1-244-703-11	18 k			
R777	1-244-707-11	27 k			
R728(R778)	1-244-745-11	1 M			
R729	1-244-649-11	100			
R802(R852) R902(R952)	1-242-663-11	390			
R803(R853) R903(R953)	1-242-731-11	270 k			
R804(R854) R904(R954)	1-242-707-11	27 k			
R805(R855) R905(R955)		--------------			
R806(R856) R906(R956)	1-242-702-11	16 k			

Ref. No.	Part No.	Description			
R807(R857) R907(R957)	1-242-679-11	1.8 k			
R808(R858) R908(R958)	1-242-697-11	10 k			
R809(R859) R909(R959)	1-242-697-11	10 k			
R810(R860) R910(R960)	1-242-697-11	10 k			
R811(R861) R911(R961)	1-242-689-11	4.7 k			
R812(R862) R912(R962)	1-242-709-11	33 k			
R813(R863) R913(R963)	1-242-713-11	47 k			
R814(R864) R914(R964)	1-242-683-11	2.7 k			
R815(R865) R915(R965)	1-242-705-11	22 k			
R816(R866) R916(R966)	1-242-706-11	24 k			
R817(R867) R917(R967)	1-242-685-11	3.3 k			
R818(R868) R918(R968)	1-242-685-11	3.3 k			
R819(R869) R919(R969)	1-242-662-11	360			
R820(R870) R920(R970)	1-242-683-11	2.7 k			
R821(R871) R921(R971)	1-242-694-11	7.5 k			
R822(R872) R922(R972)	1-242-649-11	100			
R823(R873) R923(R973)	1-242-649-11	100			
R824(R874) R924(R974)	1-242-705-11	22 k			
R825(R875) R925(R975)	1-242-665-11	470			
R826(R876) R926(R976)	1-242-665-11	470			
R827(R877) R927(R977)	1-242-625-11	10			
R828(R878)	1-202-565-11	470	±10%	½W	composition
R829(R879)	1-202-565-11	470	±10%	½W	composition
R830(R880) R930(R980)	1-244-641-11	47			
R831(R881) R931(R981)	1-244-697-11	10 k			
R832(R882) R932(R982)	1-244-721-11	100 k			
R833(R883) R933(R983)	1-244-680-11	2 k			

Ref. No.	Part No.	Description
R834(R884) R934(R984)	1-244-723-11	120k
R935(R985)	1-244-680-11	2k
R936(R986)	1-244-723-11	120k
R937(R987)	1-244-723-11	120k
R838(R888) R938(R988)	1-242-689-11	4.7k
R839(R889)	1-242-611-11	2.7
R1001	1-242-692-11	6.2k
R1002	1-242-649-11	100
R1003	1-242-703-11	18k
R1004	1-242-649-11	100
R1005	1-242-649-11	100
R1006	1-242-641-11	47
R1007	1-242-649-11	100
R1008	1-242-703-11	18k
R1009	1-242-723-11	120k
R1010	1-242-633-11	22
RT501	1-222-773-11	4.7k(B), adjustable
RV801(RV851)	1-224-049-00	250k(B), variable (VOLUME)
RV901(RV951) RV802(RV852) RV902(RV952)	1-224-050-00	50k(B), variable (TONE)
RV803(RV853) RV903(RV953)	1-224-050-00	50k(B), variable (TONE)
RV804(RV904)	1-224-048-00	100k(B), variable (BALANCE)

SWITCHES

Ref. No.	Part No.	Description	
S1-1～S1-6	1-516-122-00	rotary/slide	(SYSTEM)
S2-1～S2-7	1-516-121-00	rotary/slide	(FUNCTION)
S3-1, 2 / S4-1, 2 / S5-2, 3 / S6-1, 4	1-514-906-00	pushbutton, 4-key	(MODE) (2-CH TAPE MONITOR) (LOUDNESS) (HI-FILTER)
S3-3 / S5-1, 4 / S6-2, 3	1-514-907-00	slide	(MODE) (LOUDNESS) (HI-FILTER)
S7-1, 4	1-514-877-00	slide	(METER Level)
S7-2, 3	1-514-290-00	pushbutton, 1-key	(METER Level)
S8-1～S8-4	1-516-123-00	slide	(2-CH/4-CH)
S9	1-514-990-00	lever	(POWER)

FILTERS

Ref. No.	Part No.	Description
CF201, 202	1-527-507-11	fm i-f, ceramic; 10.70 MHz (red)
	1-527-507-21	fm i-f, ceramic; 10.66 MHz (black)
	1-527-507-31	fm i-f, ceramic; 10.74 MHz (white)
	1-527-507-41	fm i-f, ceramic; 10.62 MHz (green)
	1-527-507-51	fm i-f, ceramic; 10.78 MHz (yellow)
CF401	1-403-153-14	filter, ceramic; 455 kHz

MISCELLANEOUS

Ref. No.	Part No.	Description
CNJ1	1-509-359-00	rec/pb connector
CNJ2	1-509-403-00	ac outlet
CP1	1-231-057-00	encapsulated component, 0.033μF + 120Ω
F1～F4	1-532-298-00	fuse, 2A
F5, 6	1-532-310-00	fuse, 1.25A (Canada Model)
	1-532-336-00	fuse, 1.25A (USA Model)
J1 / J2 / J3 / J4 / J5 / J6 / J7 / J8	1-507-268-00	phono jack, 8-P (L-CH PHONO) (L-CH AUX) (L-CH REC OUT) (L-CH TAPE) (R-CH TAPE) (R-CH REC OUT) (R-CH AUX) (R-CH PHONO)
J9 / J10 / J11 / J12	1-507-163-00	phono jack, 4-P (L-CH FRONT) (L-CH BACK) (R-CH BACK) (R-CH FRONT)
J13	1-507-380-00	HEADPHONE (FRONT)
M1～M4	1-520-129-00	meter, VU
M5	1-520-130-00	meter, TUNER INPUT
TM1	1-536-286-00	terminal strip, 4-P (ANTENNA)
TM2, 3	1-536-284-00	terminal strip, 4-P (SPEAKER)
TM4	1-536-404-00	terminal strip (red)
	1-536-395-00	terminal strip, 1L1 (C)
PL1～PL4	1-518-070-00	lamp, dial; 8V/0.3A
PL5～PL6	1-518-070-00	lamp, meter; 8V/0.3A
PL7～PL8	1-518-070-00	lamp, meter; 8V/0.3A
PL9	1-518-117-00	lamp, pointer
PL10	1-518-121-61	lamp, STEREO; 4.5V/40 mA
VS	1-526-165-22	voltage selector
	1-517-054-00	holder, meter lamp; 2-P
	1-517-055-00	holder, dial lamp; 4-P
	1-533-089-00	holder, fuse; 2-P (USA Model only)
	1-533-100-00	holder, 2-P fuse (Canada Model only)
	1-533-097-00	holder, 2-P fuse
	1-534-526-00	cord, power
	1-536-248-12	terminal post
	1-536-353-00	terminal post, U-shaped (single)
	1-536-354-00	connection pin
	1-536-355-00	terminal post, U-shaped (double)
	1-581-271-00	jumper board, 4-P phono jack